Faculty of Food Technology and Biotechnology
University of Zagreb

GRADUATE STUDY
OF
BIOPROCESS ENGINEERING

NEW STUDY PROGRAMMES AT THE *FACULTY OF FOOD TECHNOLOGY AND BIOTECHNOLOGY* PROPOSAL

New study programmes, new curricula, as well as new study regulations at the Faculty of Food Technology and Biotechnology, University of Zagreb, have been worked out in accordance with the Bologna process, as well as, with the actual endeavours of the reorganization of the higher education in Croatia. The proposed models have been coordinated with the proposed studies at other faculties in the group of biotechnical faculties of the University of Zagreb, as well as with the programmes of other Croatian institutions of higher education. In this way, we have tried to reach a coordination of higher school education in our vocational segment to enable an education of modern, interdisciplinary, highly educated and highly qualified experts, ready for the challenges set before them by modern technologies in food production, as well as in the biotechnological production of drugs and chemicals. Our aim has been, at the same time, to preserve the existing distinguishing features of the Faculty of Food Technology and Biotechnology within the Mid-European framework, while, at the same time, synchronize our programmes with the leading European universities in those areas of science. We have also tried, through contacts with the representatives of food and pharmaceutical industry, i.e., with future employers of our students, to recognize the actual needs of Croatian industry, and to adapt our new programmes with their demands. Through interaction with the corresponding economic subjects, we have tried to clear out all the doubts concerning the new profiles of our future Bachelors and Masters, in what their competences and employment perspectives are concerned.

Basically, our new programmes rely on the existing study programmes and curricula of food technology and biotechnology, which have been carried out at the Faculty of Food Technology and Biotechnology since 1956, thus representing the tradition and the development thread of this faculty since the times of the Biotechnological Department at the Faculty of Technology, and especially since 1980, when the Faculty of Food Technology and Biotechnology started to act as a separate Faculty of the University of Zagreb. The study of Nutrition (Food Science) was first developed as a section within the study of Food Technology, but it is our opinion that the development of this science, as well as the interest the general public has shown for it in recent years, justifies the introduction of separate undergraduate and graduate studies in this area of science, as well as the already existing postgraduate study. Following the worldwide and, above all, the European actual trends, a special interest has been given, in relation to the existing programmes, to the quality control in food and drugs production.

Besides all the radical changes in the sense of modernization and, especially, in teaching techniques and methodology, the whole process can, basically, be summarized as the continuation or evolution of scientific and educational programmes at the Faculty of Food Technology and Biotechnology. This Faculty also possesses all the predispositions for the proposed studies: competent teaching staff, adequate premises and equipment, which, although partly outdated and inadequate, has served the purposes of the ongoing teaching needs in a satisfactory way. Therefore, the introduction of new programmes and curricula at the Faculty of Food Technology and Biotechnology is neither conditioned by greater investment requirements, buying of capital facilities (although the renewal and completing of the existent equipment is of first importance for enabling the quality realisation of this type of studies), nor is it conditioned by employment of additional teaching staff. However, the inclusion of visiting lecturers from other European universities, as well as of specialists working in the economy sector in certain segments of the curriculum, where they could transfer their expertise and experience to our students, has been anticipated.

Considering the up to date practice, experience, qualification, equipment and abilities, the Faculty of Food Technology and Biotechnology has to offer, as well as the estimation of the employers' needs, we propose three undergraduate and five graduate studies, which would satisfy the present and future needs in the economy and in the public sector for food technologists, biotechnologists and nutritionists.

New studies proposed to be lectured at the Faculty of Food Technology and Biotechnology, University of Zagreb:

Undergraduate studies

1. Undergraduate study of Food Technology
2. Undergraduate study of Biotechnology
3. Undergraduate study of Nutrition

Graduate studies

1. Graduate study of Food Engineering
2. Graduate study of Food Safety Management
3. Graduate study of Bioprocess Engineering
4. Graduate study of Biotechnology
5. Graduate study of Nutrition

Dean

Faculty of Food Technology and Biotechnology

Professor Vladimir Mrša, Ph.D.

GRADUATE STUDY OF BIOPROCESS ENGINEERING

PROPOSAL OF THE GRADUATE STUDY PROGRAMME

1. INTRODUCTION

a) Reasons for launching the study:

- *estimation of its feasibility with regard to the labour/work market in public and private sector*

According to the definition of the European Federation for Biotechnology «biotechnology is an integrated application of natural and engineering sciences with the aim of using living organisms, cells and their component parts for products and services» (EFB,1989). At the turn of the century, biotechnology represents one of the most important highly-developed technologies, as well as technology platform which enables the creation of novel products, services and industrial processes in various facets of society: health care and pharmaceutical industry (so-called red biotechnology or *biopharma*), food production (so-called green biotechnology or *agri-biotech*), industrial production of chemicals (so-called white biotechnology or *industrial biotech*), and in the environment protection (so-called blue biotechnology or *environmental biotech*).

All developed countries, with no exceptions, as well as many other countries, which efficiently plan their own development as well, have recognized biotechnology as a vital lever of sustainable agricultural growth, and have chosen their strategic course and have concentrated their resources on the development of biotechnology. Many countries have adopted ambitious plans of constructing their own scientific basis and biotechnological infrastructure, which would be put in motion in the next 5 to 10 years. The examples of Singapore, Taiwan, New Zealand, Australia, Scandinavian countries, but also some East European countries, are already known.

The production of drugs, food and beverages has been the most successful sector of Croatian economy, where it accounts for a major part in terms of income, employment and export. Its vitality and competitiveness will, in a great measure, depend on the dynamics of the development of biotechnology.

Ample supplies of quality potable water and the preserved environment represent the most important wealth in natural resources of the Republic of Croatia. Optimal management of these resources will not be able without a developed biotechnology.

The strategic significance of biotechnology in the development of the Republic of Croatia has also been emphasized in the studies on the strategic development of the Republic of Croatia in "Croatia in the 21st century – Science" (The Official Gazette -NN 108/03) and in the Strategy of Agriculture and Fishing in the Republic of Croatia (The Official Gazette -NN 89/02). For the realization of these objectives, however, adequately educated experts are needed.

Bioprocess (biochemical) engineering covers all the engineering aspects of the biotechnological production. It developed from chemical engineering in the 50s of the 20th century when the introduction of the first antibiotic production in industrial proportions was supposed to solve, in a short period of time, a series of engineering problems, unknown until then, in the field of engineering (sterility and sterile techniques of manipulation of large volumes, microbiological filtration of fluids, kinetics of microbial processes, mixing and aeration). Since then biochemical engineering has been introduced as a separate study at many universities world-wide. The Department for Biochemical Engineering at the Faculty of Food Technology and Biotechnology, University of Zagreb (derived from the Section for Biotechnology) has been, since its beginnings until today, the first and the main factor for the development of biochemical engineering in Croatia, in terms of science, vocation and teaching. Recently, the name of "biochemical engineering" has frequently been changed, in professional terminology, into a clearer and more precise name "bioprocess engineering", so this term has been chosen for the new graduate study programme.

The proposed graduate study programme of bioprocess engineering is a direct continuation of the undergraduate study of biotechnology with the aim of educating experts skilled for performing highly complicated tasks in the fields of designing and conducting biotechnological processes, research work and process development, as well as, the production of modern biotechnology and management of biotechnological companies.

- *correlation with recent scientific achievements and/or skills based on those achievements*

In the field of modern biotechnology, the presence of new technologies, based on the scientific breakthrough of molecular genetics, cell biology and engineering, as well as (in the near future) nanotechnology, has been emphasized. Thus, a close relation and cooperation between the teaching process and the work on scientific research projects at the Faculty of Food Technology and Biotechnology is expected. This will enable the development of abilities for an individual and creative work in the fields of research and development as well as for introducing new technologies.

- *comparability with other study programmes of eminent foreign universities (universities, higher schools, polytechnics, etc.), especially with the universities of the European Union. It is advisable to name, with an appropriate argumentation, up to two study programmes, equivalent or analogous to the proposed programme.*

The proposed programme has been worked out from the programmes of eminent European universities (Wageningen University, Delft University, Gent University) which incorporate modern and internationally recognized studies of biotechnology and biochemical engineering, thus is comparable to them.

b) Up-to-date experience of the proposing institution in the endorsement of equivalent or related study programmes

The study of biotechnology has been lectured, under different subject titles, at the University of Zagreb, since 1956, (at the then Faculty of Chemistry Food Technology and Mining). It was one of the first studies of biotechnology in Europe. Since 1960, it was established as the Biotechnological Department at the Faculty of Technology, University of Zagreb. In 1978, The Biotechnical Department separated from the Faculty of Technology and has since been an independent department at the Faculty of Food Technology and Biotechnology, which was then founded at the University of Zagreb. At the newly founded Faculty of Food Technology and Biotechnology the Department of Biochemical Engineering has taken upon itself the lecturing of almost all biotechnological courses.
Biochemical engineering was introduced as a separate course into the five-year study programme of Biotechnology, which was then a new study programme started during the academic year 1971/72. Until then the subject matter covering biochemical engineering was, for the most part, lectured in the frame of the course of Industrial Microbiology. When the study programme and curricula at the Faculty of Food Technology and Biotechnology, University of Zagreb, were changed in 1987, the study course Biochemical Engineering was introduced, and since then, the study programme and curricula, dating from the year 2002, there have been two study courses included in the new study programme of Biotechnology: Biochemical Microbiology and Biochemical Engineering.
At this point, it should be emphasized that as early as in 1960, in cooperation with the largest pharmaceutical company in Croatia, PLIVA, Zagreb, a postgraduate study in Chemistry and Technology of Antibiotics was organized. This was one of the first postgraduate studies in the field of biotechnology in Europe. A group of engineers from PLIVA were educated through this postgraduate study programme. After graduating, they developed the technological procedures and organized the industrial production of an antibiotic - oxitetracyclin. At the time, this was a superior technology on the international level, based on our own knowledge and development.

b) If a graduate study id suggested, possible partners outside the higher education (goverment management, public sector, etc.), interested, or possibly interested should be listed.

Biotechnological industry, food industry and pharmaceutical industry (PLIVA, Agrocor, Podravka, Kvasac, Badel, beer breweries, SMS, LURA, etc.) are interested in cooperation and involvement in this study programme. Interest of relevant ministries and agencies responsible for biotechnological products, food and drugs production, and in the environmental protection are expected, because these institutions have been continually employing our experts in these fields.

c) Openness to students' mobility

This study programme has been conceived to enable the inclusion of students having started their studies at another study at the Faculty of Food Technology and Biotechnology or at another related study in the field. The conditions of students transfer will be defined subsequently, after the study programmes of other related faculties will be known, as well. Mobility modality would be based on the EU *ERASMUS/SOCRATES scheme.*

2. GENERAL INFORMATION

2.1. Study title

Graduate study of Bioprocess Engineering

2.2. The proposing institution in charge of the study programme and the performing institution in charge of the study programme

Faculty of Food Technology and Biotechnology, University of Zagreb.

2.3. Study duration

Two years

2.4. Enrolment conditions

Successful completion of undergraduate study at the Faculty of Food Technology and Biotechnology or at another related faculty in the field at home or abroad, under condition of having a sufficient number of ECTS credits in modules, which are basic for this study.

2.5. *Competences the students acquire after graduating, the work the students are competent to perform after finishing the three-year study programme, as well as the related studies the students could enrol within the institution – proposer and/or at other related institutions in the Republic of Croatia in case the students decide to continue their studies.*

This graduate study, as a continuation of the undergraduate study in the field, will develop new competences necessary for activities of high level of complexity, such as work in research and development, control laboratories, management and control of biotechnological processes. Graduate Masters in bioprocess engineering will also have competences, based on knowledge, for putting in action and managing biotechnological companies.
Undergraduate study of Biotechnology, as well as studies of Food Technology and Nutrition at the Faculty of Food Technology and Biotechnology is best suited for the continuation of studies at graduate study programme of Bioprocess Engineering. The consistency could be foreseen, in greater or lesser extent, with the undergraduate studies at the following Faculties: Faculty of Natural Sciences and Mathematics, Faculty of Agronomy, Faculty of Pharmacy and Biochemistry, which would partly be sufficient for the following the lecturing processes at this study.

2.6. Vocational or academic title or degree earned after graduation

Master of Bioprocess Engineering.

3. PROGRAMME DESCRIPTION

3.1. The list of compulsory and elective subjects with hours of direct courses and number of ECTS points

See the Appendix.

3.2Description of each module

See the Appendix.

APPENDIX:

LIST AND DESCRIPTION OF COMPULSORY AND ELECTIVE MODULES

Graduate study of bioprocess engineering
Study duration: 2 years
Title: Master of Bioprocess Engineering

Year/ Semester.	Module	ECTS	Hours	Coordinator
1 / I	Physiology of industrial microorganisms	6	70	S. Novak
	Bioprocess kinetics	6	75	P. Horvat/ B. Šantek
	Reactor engineering	4	50	Ž. Kurtanjek
	Elective modules A	14		
	Total	30		

Year/ Semester.	Module	ECTS	Hours	Coordinator
1 / II	Methodology of scientific work and intelectual property protection	4	50	J. Kniewald
	Biochemical engineering and bioprocess techniques	8	105	P. Horvat/ B. Šantek
	Biotechnology in environment protection	4	52	T. Landeka Dragičević
	Elective modules A	14		
	Total	30		

Year/ Semester.	Module	ECTS	Hours	Coordinator
2 / III	Bioprocess design	4	52	B. Šantek/V. Marić
	Isolation and purification of biotechnology products	6	75	S. Novak
	Master Thesis	10		
	Elective modules A and B*	10		
	Total	30		

Year/ Semester.	Module	ECTS	Hours	Coordinator
2 / IV	Management	5	60	I. Vajić
	Elective modules B	5		
	Master Thesis	20		
	Total	30		

Elective modules group A :

Module	ECTS	Hours	Coordinator
Brewing technology	4	48	V. Marić
Enzyme technology	4	49	J. Šušković
Antibiotic technology	4	49	J. Šušković
Technology of alcohol and yeast	4	50	S. Grba
Technology of animal and plant cultures	4	50	Z. Kniewald
Probiotics and starter cultures	3	39	J. Šušković
Modelling of biotechnology processes	4	50	Ž. Kurtanjek
Technology of vitamins and hormones	4	50	Z. Kniewald
Biotechnological aspects of wine production	4	48	S. Novak
Biochemical analytics	6	75	V. Mrša
White biotechnology	4	48	S. Novak/ P. Horvat

Elective modules group B:

Module	**ECTS**	**Hours**	**Coordinator**
Modelling and chemometrics in food engineering	3	40	Ž.Kurtanjek
Robotics in food industry	3	40	Ž.Kurtanjek
Applied chemometrics	3	33	B.Grabarić
Sensory and chemical evaluation of wine	3	35	M.Banović
Production and use of baker's and food yeast	3	40	V.Stehlik Tomas
Corrosion and materials protectioon	2	20	N.Ciković
Advances in production, processing and application of lecithin	3	35	Ž.Mokrovčak
Shelf-life of packaged foodstuffs	2	20	K.Galić
The microbiological, chemical and physical monitoring in brewing process	3	40	S.Beluhan
Bioinorganic chemistry of elements	3	30	B.Grabarić
Biodegradation of organic compunds	3	35	T.Landeka Dragičević
Lipase-catalysed preparation of chiral compounds	3	39	S.Đaković
Programming in bioinformatics	2	25	D.Hranueli
Modified fats and fats	3	35	D.Štrucelj
Green chemistry	3	35	M.Jukić
Fundamentals of biorganometal chemistry	3	35	V.Rapić
Peptidomimetics and pseudopeptides	3	39	V.Rapić
Foreign language (English, French, German)	2/3		A. Šupih-Kvaternik Z. Mandelić

* As elective module group B students can enroll any compulsory module from any other study, any election module group A, or any module from the table above.

OBRAZAC za unos podataka o sadržaju i izvoditeljima modula

I. BASIC DATA ON PROPOSED MODULE

Name of module: **PHYSIOLOGY OF INDUSTRIAL MICROORGANISMS**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): 1(1)

Module status: Ground, ElectiveA, Elective B Ground

Language:

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full professor	Srđan	Novak
Scientific-educational title	name	surname

Number of ECTS points 6

Total number of contact hours: 70

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	40
	Auditory Practice	
	Laboratory Practice	30
	Practicum	
	Seminar	
	Field Work	

Requirements for signature to be appended

Regular attendance of lectures and exercises.

Manner in which examination is taken: Written [X] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Introduction: 6 hours

Definitions. Clasification and review of bioprocesses, working microorganisms and products. Methods of microbial physiology.

Biomembranes, energetics, transport: 6 hours

Structure of microbial cell membranes. Energetic processes in the cell membranes. Oxidative phosphorylation. Anaerobic respiration and fermentation. Molecullar transport mechanisms of dissolved matters through membrane.

Specific biochemical pathways in industrial microorganisms: 6 hours

Energetic metabolism: glycolisis, HMP pathway, ED pathway, phosfoketolase pathway, oxidation of alkanes and C1 compounds, alcoholic, lactic and acetone-butanole fermentation. Catabolism: Cell wall synthesis, growth and reproduction, cell cycle, PHB synthesis, secondary metabolits and precursors, sporulation and diferentiation.

Examples of microbial metabolism regulation: 6 hours

Levels of regulation. Operon, regulon and modulon. PTS and catabolic repression in bacteria. RelA i SpoT modulon in enterobacteria.

***S. cerevisiae* and other yeasts: 6 hours**

Review of regulation mechanisms in yeasts. Pasteur, Crebtree and Kluyver effects.

Other working microorganisms: 10 hours

Lactic acid bacteria, *Acetobacter* and *Gluconobacter*, *Streptomycetes*, *Aspergillus*, physiology of rDNA microorganisms

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

With this module students will get higher level of knowledge in microbial physiology after they had completed studies in microbiology, biochemistry and genetics.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	Alberts B. i sur.: The Cell, 1983., Garland Publishing, Inc., New York & London.
2.	Lengeler J.W., Drews G., Schlegel H.G.: Biology of the Prokaryotes, 1999., Georg Thieme Verlag, Stuttgart, New York.
3.	Moat A.G.: Microbial Physiology, 1979., John Wiley & Sons, New York.
4.	Biotehnologija, (ed. P. Raspor), Bia, Ljubljana 1996.
5.	

Recommended literature

No.	Title
1.	Industrial Microbiology and Biotechnology, (eds A.L.Demain, J.e. Davies) ASM Press Washington 1999.
2.	
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full Professor	Novak	Srđan
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:

E-mail address: srnovak@pbf.hr

Address of personal web page:

Date of last review:

CV (no more than 1200 characters): I was born on Janury 3rd 1952. I graduated biotechnology studies on the Faculty of Technology, University of Zagreb in 1976. I have been working on the Faculty of Food Technology and Biotechnology, University of Zagreb since 1977 where I completed Master Thesis in 1984. and Ph.D. Thesis in 1992. I spent 15 months at the California Institute of Technology, Pasadena, California, USA and 10 months at Labatt Institute, London, Ontario, Canada. The area of my scientific interests cover biochemical engineering and microbial physiology. I attanded many scientific congresses with approximately 50 communications and I have published 28 scientific publications (16 of them are indexed in SCI). Professionally I worked on different biotechnological processes and procedures (beer production, organic acids, antibiotics, food products, waste water treatment and tretment of waste management). I am member of Croatian Academy of Engineering, Croatian Society of Biotechnology (4 years as the president, 9 years as the member of Executive Board) and some other societies. I am the member of the editorial board of few scientific journals. I am full professor since 2004.

List of relevant titles published within the last five years:

1.	M. Ivančić, B. Šantek, S. Novak, and V. Marić, Fermentative bioconversion in a horizontal rotating tubular bioreactor. Proc. Biochem. 39 (8); 995 - 1000; 2004.
2.	M. Ivančić, B. Šantek, S. Novak, P. Horvat and V. Marić, Bioprocess kinetics in a horizontal rotating tubular bioreactor. Bioprocess Biosyst. Eng. 26; 169 - 175; 2004.
3.	A. Slavica, B. Šantek, S. Novak and V. Marić, Microbial acetate oxidation in horizontal rotating tubular bioreactor. J. Biosci. 29; 169 - 177; 2004
4.	B. Šantek, P. Horvat, S. Novak, V. Marić, Kriteriji povećanja obujma bioreaktora, Kem. Ind., 53 (1); 7 - 24; 2004.
5.	S. Novak, *V. Zechner-Krpan*, V. Maric'. Regulation of maltose transport and metabolism in *Saccharomyces cerevisiae*. Food Technol. Biotechnol 42 (3), 213-218, 2004.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	S. Novak, T. D'Amore, I. Russell and G. G. Stewart, Characterization of sugar transport in 2-deoxy-D glucose resistant mutants of yeast. J. Ind. Microbiol. 6; 149-155, 1990.
2.	M. Matošić, S. Novak and V. Marić, Influence of 2-deoxy-D-glucose on cell growth of the yeast *Saccharomyces cerevisiae.* Food technol. biotechnol. 34; 97-100, 1996.
3.	S. Novak and V. Marić, Utjecaj glukoze na energetski metabolizam kvasca – represija glukozom i katabolička inaktivacija. Preh. Bioteh. Rev. 31; 35-42, 1993.
4.	J. Šušković, S. Novak, V. Marić and S. Matošić, Lactic acid fermentation kinetics on different carbon sources. Preh. Bioteh. Rev. 29; 155-158, 1991.
5.	S. Novak ,V. Zechner-Krpan, P. Raspor and V. Marić, Transport ugljikohidrata i regulacija metabolizma ugljikohidrata kod kvasca *Saccharomyces cerevisiae:* II Galaktoza. Kem. Ind. 49; 433-441, 2000.

Curriculum course (subject) instructor:

Assistant professor	Vesna	Zechner-Krpan
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed:

E-mail address: vzkrpan@pbf.hr

Address of personal web page:

Date of last review: 12. 5. 1998.

CV (no more than 1200 characters):

Born on March 31th, 1965., married, mother of two children. She finished her primary and secondary education in Zagreb with excellent marks. On the Faculty of Food Technology and Biotechnology, Zagreb she made her diploma work, master and doctoral theses. She is working since 1988. on the Faculty of Food Technology and Biotechnology, Department of Biochemical Engineering (young assistant; 1988-1992.; assistant 1992-1995.; assistant professor 1998-) Specialisation at United States Department of Agriculture, Maryland, USA (3 months in 1990.) and at Department of Biological Sciences, University Auckland, New Zealand (3 months in 1996). She attanded in 1998. Bioprocess Engineering Course, in Supetar, on island Brač and in 2004. Liquid Chromatography Course, PLIVA, Zagreb. She is member of Croatian Society of Microbiology, Croatian Biochemical Society and European Federation of Biotechnology. She is also a member and treasurer of Croatian Society of Biotechnology (from 1996-2000., 2002-2004., 2004-). As author and co-author she published 8 scientific and 4 professional papers and attanded 12 congresses with presentations. She co-worked on 10 scientific projects and leaded one joint project. Nowadays she is leading and is main scientist on technological project granted by Ministry of Science and Technology of RH (2002-). Speaks, writes and reads English and German languages.

List of relevant titles published within the last five years:

No.	Title
1.	S. Novak, **V. Zechner-Krpan**, P. Raspor, V. Marić. Transport ugljikohidrata i regulacija metabolizma ugljikohidrata u kvasca *Saccharomyces cerevisiae* Kem. Ind. 49, 433-441, 2000.
2.	**V. Zechner-Krpan**, V. Marić. Microbes and functional foods. In: Current Studies of Biotechnology, Vol III, Food, 121-131, 2003
3.	S. Novak, **V. Zechner-Krpan**, V. Marić. Regulation of maltose transport and metabolism in *Saccharomyces cerevisiae.* Food Technol. Biotechnol 42 (3), 213-218, 2004.
4.	V. Petravić Tominac, K. Blagojević, S. Novak, **V. Zechner-Krpan**, V. Marić. Fermentative properties of some *Saccharomyces cerevisiae* wine yeasts. Periodicum Biologorum 107, 2005.
5.	V. Petravić Tominac, H. Eke, Đ. Šehović, **V. Zechner-Krpan**, S. Novak, V. Marić. Fermentation of Graševina must with different strains of wine yeast. Periodicum Biologorum 107, 2005.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	S. Novak, **V. Zechner-Krpan**, P. Raspor, V. Marić. Transport ugljikohidrata i regulacija metabolizma ugljikohidrata u kvasca *Saccharomyces cerevisiae* Kem. Ind. 49, 433-441, 2000.
2.	V. Marić, **V. Zechner-Krpan**. Microbial technology and functional foods. Functional Foods, 21st Food Technology Days 2001, str. 181 - 193, November, 8 – 9, 2001. Portorož, Slovenia.
3.	**V. Zechner-Krpan**, V. Marić. Microbes and functional foods. In: Current Studies of Biotechnology, Vol III, Food, 121-131, 2003
4.	S. Novak, **V. Zechner-Krpan**, V. Marić. Regulation of maltose transport and metabolism in *Saccharomyces cerevisiae.* Food Technol. Biotechnol 42 (3), 213-218, 2004.
5.	V. Petravić Tominac, K. Blagojević, S. Novak, **V. Zechner-Krpan**, V. Marić. Fermentative properties of some *Saccharomyces cerevisiae* wine yeasts. Periodicum Biologorum 107, 2005.

Curriculum course (subject) instructor:

Associate Professor	Božidar	Šantek
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Lectures (2 units), practicum

E-mail address: bsantek@pbf.hr

Address of personal web page:

Date of last review: December 1st 2003.

CV (no more than 1200 characters):

Born in Ludbreg (Croatia) on May 27th, 1966. He finished primary school in Ludbreg and secondary school for chemical technician in Varaždin (1985). After army service (1986) he started the study on the Faculty of Food Technology and Biotechnology, University of Zagreb and he graduated in 1990. In 1991 he started to work as a research assistant at the Faculty of Food Technology and Biotechnology. He defended his M. Sc. Thesis in 1994 and PhD Thesis in 1996. In 1998 he was appointed for Assistant Professor at the Faculty of Food Technology and Biotechnology, University of Zagreb. From February 1st 2001 until February 1st 2002 and June 1st 2002 until December 1st 2002 he was guest researcher at University Bielefeld (Germany). On December 1st 2003 he was appointed for Associate Professor in the Department of Biochemical Engineering of the Faculty of Food Technology and Biotechnology, University of Zagreb. Until now, results of his scientific work were presented in 14 papers and at 22 posters. He was invited speaker on three scientific conferences. He speaks English and German.

List of relevant titles published within the last five years:

No.	Title
1.	B. Šantek, P. Horvat, S. Novak, D. Sunko, A. Moser and V. Marić, Estimation of axial dispersion in horizontal rotating tubular bioreactor by means of a structured model. Bioprocess Eng. 23; 265 - 274; 2000.
2.	M. Ivančić, B. Šantek, S. Novak, and V. Marić, Fermentative bioconversion in a horizontal rotating tubular bioreactor. Proc. Biochem. 39 (8); 995 - 1000; 2004.
3.	M. Ivančić, B. Šantek, S. Novak, P. Horvat and V. Marić, Bioprocess kinetics in a horizontal rotating tubular bioreactor. Bioprocess Biosyst. Eng. 26; 169 - 175; 2004.
4.	A. Slavica, B. Šantek, S. Novak and V. Marić, Microbial acetate oxidation in horizontal rotating tubular bioreactor. J. Biosci. 29; 169 - 177; 2004
5.	B. Šantek, P. Horvat, S. Novak, V. Marić, Kriteriji povećanja obujma bioreaktora, Kem. Ind., 53 (1); 7 - 24; 2004.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	B. Šantek, Utjecaj vode na pripremu, učinkovitost i potrošnju sredstava za čišćenje i dezinfekciju, Svijet Piva, 3; 6-12; 1998.
2.	Od 1998. godine urednik sekcija "Povijest pivovarsta, Zanimljivosti o pivu i Pivo kao hobi" časopisa Svijet piva.
3.	M. Felski, E. Flaschel, K. Friehs, B. Šantek, M. Lotz, Fermentation von *Euglena gracilis* in konditioniertem Kartoffelfruchtwasser (KFW) mit dem Ziel der Paramylon - Produktion, Chemie Ingenieur Technik, 74 (5), 2002, 600 - 601.
4.	B. Šantek, P. Horvat, S. Novak, B. Mayr, A. Moser and V. Marić, Mathematical model of mixing in a horizontal rotating tubular bioreactor: "Spiral flow" model. Bioprocess Eng. ; 14 ; 223 - 229; 1996.
5.	B. Šantek and V. Marić, Temperature and dissolved oxygen concentration as parameters of *Azotobacter chroococcum* cultivation for use in biofertilizers, Biotechnol. Letters 17 (4); 453 - 458; 1995.

Curriculum course (subject) instructor:

Full proffesor	**Jagoda**	**Šušković**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of biochemical engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: lectures

E-mail address: jsusko@pbf.hr

Address of personal web page:

Date of last review: April 6, 2004

CV (no more than 1200 characters): Prof. Jagoda Šušković was born in Klobuk, Ljubuški on November 7th, 1955. She was graduated on 1980 at Biotechnology study course, Faculty of Technology, University of Zagreb. She won master's degree on 1989 and Ph.D. on 1996. Since1980 she worked as a Junior Assistant, and since 1989 as Assistant on the Laboratory for Antibiotic and Enzyme Technology, Department of Biochemical Engineering, Faculty of Food Technology and Biotechnology, University of Zagreb. On 1997 she was appointed for Assistant Professor, then on 2000 for Associate Professor and on 2004 for Full Professor. Prof. Jagoda Šušković is a supervisor of postgraduate study "Biotechnology – Bioprocess Engineering" at the Faculty of Food Technology and Biotechnology. Her scientific work covers different fields of biotechnology, biochemical engineering and industrial microbiology, as well as biosynthesis optimization of microbial metabolites (antibiotics, alkaloids, enzymes, lactic acid) and probiotics and starter cultures production. She contributed and has been a supervisor of 20 diploma works, 2 Master Thesis and 2 Ph.D. She is a principal investigator of scientific project "Role of lactic acid bacteria in synbiotic effect". She has published 32 scientific papers (14 of them are Current Content cited). She speaks English and French.

List of relevant titles published within the last five years:

No.	Title
1.	J. Frece, B. Kos, I. K. Svetec, Z. Zgaga, V. Mrša, J. Šušković, Importance of S-layer proteins in probiotic activity of *Lactobacillus acidophilus* M92, *J. Appl.Microbiol. 98* (2005)285-292.
2.	B. Kos, J. Šušković, S. Vuković, M. Šimpraga, J. Frece, S. Matošić, Adhesion and Aggregation Ability of Probiotic Strain *Lactobacillus acidophilus* M92, *J. Appl. Microbiol. 94* (2003) 981-987.
3.	J. Šušković, B. Kos, J. Goreta, S. Matošić, Role of lactic acid bacteria and bifidobacteria in synbiotic effect, *Food Technol. Biotechnol. 39* (2001) 227-235.
4.	J. Šušković, B. Kos, S. Matošić, V. Besendorfer, The effect of bile salts on survival and morphology of a potential probiotic strain *Lactobacillus acidophilus* M92, *World J. Microbiol. Biotechnol. 16* (7) (2000) 673-678.
5.	B. Kos, J. Šušković, J. Goreta, S. Matošić, Effect of Protectors on the Viability of *Lactobacillus acidophilus* M92 in Simulated Gastrointestinal Conditions, *Food Technol. Biotechnol. 38* (2) (2000) 121-127.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	J. Šušković, B. Kos: Probiotics and prebiotics, Internal script, 2000.
2.	Principle investigator on the project: Role of lactic acid bacteria in synbiotic effect (MZT RH, 0058009) 2002. -
3.	1996-2002. investigator on the project: Probiotic activity of lactic acid bacteria (MZT RH, 058403)
4.	Supervisor of the Master thesis: Jadranka Frece, *In vitro* and *in vivo* investigations of the mechanism of probiotic action of *Lactobacillus acidophilus* M92, *Lactobacillus plantarum* L4 and *Enterococcus faecium* L3, Faculty of Food Technology and Biotechnology, University of Zagreb, 2003.
5.	J. Šušković, B. Brkić, S. Matošić: Mode of probiotic action of lactic acid bacteria. In: "Fermented dairy products in diet and dietetics", Živković, M. Hadžiosmanović, V. Oberiter (Eds.), Hrvatska akademija medicinskih znanosti - Senat, Zagreb (1996) pp. 21-34.

I. BASIC DATA ON PROPOSED MODULE

Name of module: **BIOPROCESS KINETICS**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): **1/I**

Module status: Ground, ElectiveA, Elective B **Ground**

Language: German

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Associate Professor	Predrag	Horvat
Scientific-educational title	name	surname

Number of ECTS points 6

Total number of contact hours: 75

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	30
	Auditory Practice	
	Laboratory Practice	
	Practicum	
	Seminar	45
	Field Work	

Requirements for signature to be appended

Finished lectures and seminar

Manner in which examination is taken: Written [X] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

In this module, during lectures, students will study kinetics of microbial growth, substrate uptake and product formation, effect of physical and chemical conditions on cell reactions rate in industrial bioprocesses. Knowledge of basic macro-kinetics parameters will be adopted. In particular, non-limited growth kinetics, limited growth kinetics on different substrates, microbial product formation kinetics, metabolism product inhibition, sequential substrate utilisation kinetics, growth kinetics of mixed populations, kinetics in biofilms, pellets and flocs, will be elaborated. Differences between formal-kinetic and metabolic-structural approach in biotechnological processes will be explained, especially in heterogeneous environment conditions. During seminars students will determine from experimental data, both graphically and arithmetically, kinetic parameters of non-catalysed and catalysed reactions, simple and complex enzyme reactions, kinetic parameters of growth, substrate utilisation, endogenous metabolism and death of microbial cells. As well, students will study methods for determination of pH-value and temperature effect on bioprocess kinetic parameters, especially on product formation in heterogeneous and homogeneous environment conditions. Also, students will learn to determine kinetic properties of mixed microbial populations and simultaneous substrate utilisation.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Students will acquire knowledge and skills of bioprocess kinetics, methods of kinetic process analysis and their application in real bioprocess.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	A. Moser, Bioprocess Technology, Kinetics and Reactors, Springer Verlag, New York, Wien, 1988.
2.	A. Cornish-Bowden, Fundamentals of Enzyme Kinetics, Portland Press, London, 1995
3.	K.M. Plowman, Enzyme Kinetics, McGraw-Hill, Book Company, New York, 1972.
4.	
5.	

Recommended literature

No.	Title
1.	Biotechnology, (H.J. Rehm and G. Reed, eds.), Vol. 2, (vol. ed. H. Brauer), A. Moser: (Ch. 11-17) 173-349, VCH Weinheim, 1985.
2.	A. Cornish-Bowden, Fundamentals of Enzyme Kinetics, Portland Press, London, 1995
3.	M. Chaplin and C. Bucke, Enzyme Technology, Cambridge University Press, Cambridge, 1990
4.	A. G. Marangoni, Enzyme Kinetics: A Modern Approach , Wiley, NewYork, 2004
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Associate Professor	Predrag	Horvat
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: Lectures and seminar

E-mail address: phorvat@pbf.hr

Address of personal web page:

Date of last review: December 18th 2001.

CV (no more than 1200 characters):

He was born in 1953. in Jurčevac (District of Međimurje). He completed elementary school in 1967 and high school in 1971 in Varaždin. He graduated at Department of Biotechnology, Faculty of Technology, at University of Zagreb in 1976 acquiring the degree of the Bachelor of Science. He obtained Masters degree in 1983, and Doctoral degree in 1989 at Faculty of Food Technology and Biotechnology, University of Zagreb. He worked on constructing of the Yeast Factory and the Polyester fibbers Factory and as well during production at the Yeast Factory and the Institute of security, conflagration protection and human environment safety as Technical manager. He was advisor for projecting and supervision of bioprocess facilities at companies ASA and Tepro-BWT, Austria. Since 1986. works at Faculty of Food Technology and Biotechnology as assistant, docent and associated professor (Field of Biochemical Engineering and Industrial Microbiology). He participated in UNESCO-IBRN seminar. As postdoctoral fellow RZ Alpe-Adria he resided at TU Graz where he became scientific researcher (Austrian-French project "Mixing and Bioreactors Performance"), and researcher at "Institut fuer Biotechnologie und Bioprozesstechnik", "Institut fuer Grundlagen der Verfahrenstechnik" and "Institut fuer Ressourcenschonende und Nachhaltige Systeme". Today Prof. Predrag Horvat is lecturer of Biochemical Engineering and Kinetics of Processes in Biotechnology.

List of relevant titles published within the last five years:

No.	Title
1.	G. Braunegg, R. Bona, P. Horvat: Study On Potential Routes For Acrylamide Synthesis And/Or Synthesis Of Precursors, 1-55. (2004) (Review, 55 pages, 95 references, elaborated under the contract for CIBA Basel R&D ,available only under permission from the contractor)
2.	Koller, Martin; Bona, Rodolfo; Braunegg, Gerhart; Hermann, Carmen; Horvat, P.; Kroutil, Markus; Martinz, Julia; Neto, Jose; Pereira, Luis; Varila, Paula: Production of Polyhydroxyalkanoates from Agricultural Waste and Surplus Materials**.** Biomacromolecules (2005 in press) ISSN: 1525-7797.
3.	M. Koller*, R. Bona, C. Hermann, P. Horvat, J. Martinz, J. Neto, L. Pereira, P. Varila and G. Braunegg: Biotechnological Production of Poly(3-hydroxybutyrate) by Wautersia eutropha: Application of Green Grass Juice and Silage Juice as Novel Complex Co-Substrates , Biocatalysis and Biotransformation, (2005 in press)
4.	M. Ivančić, B. Šantek, S. Novak, P. Horvat and V. Marić: Bioprocess kinetics in a horizontal rotating tubular bioreactor. Bioprocess Biosyst. Eng. 26; 169 - 175; 2004.
5.	

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Nenadic, I.; Mihaljevic, K.; Bosnjak, M.; Horvat, P.: Application efficiency of biomass hydrolyzate separated in oxytetracycline production, Mededelingen - Faculteit Landbouwkundige en Toegepaste Biologische Wetenschappen (Universiteit Gent) 61(4b), 2149-2152, 1996.
2.	Neubeck, Michael; Prenner, Elmar; Horvat, P.; Bona, Rudolfo; Hermetter, Albin; Moser, Anton: Membrane fluidity in glutamic acid-producing bacteria Brevibacterium sp. ATCC 13869. Archives of Microbiology , 160(2), 101-7, 1993.
3.	Malesevic, N.; Cvjeticanin, A.; Horvat, P.; Pavusek, I.; Maric, V.: Inhibition of growth by the product of Acetobacter aceti S-2 in batch fermentation, Chemical and Biochemical Engineering Quarterly 6(2), 71-4, 1992.
4.	Stefanec, Z.; Vranar, K.; Horvat, P.; Pavusek, Ivanka : Role of nitrogen sources and metal ions in urease synthesis by Micrococcus varians, World Journal of Microbiology & Biotechnology, 6(2), 195-200, 1990.
5.	P.Horvat:" Utjecaj faktora okoline na sintezu ureaze u stanicama bakterije *Micrococcus varians* i kinetiku razgradnje uree" disertacija (1989)
6.	Sobota, V.; Huzjak, D.; Horvat, P.; Marić, V.:Dependence of the urea hydrolysis rate on pH and temperature in different bacterial strains., Prehrambeno-Tehnoloska i Biotehnoloska Revija 26(1-2), 15-18, 1988.

I. BASIC DATA ON PROPOSED MODULE

Name of module: **ISOLATION AND PURIFICATION OF BIOTECHNOLOGICAL PRODUCTS**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [**X**] or Graduate (Ms) [ ] Append X in the appropriate box

Academic year in which module appears (semester): **3/V**

Module status: Ground, ElectiveA, Elective B **Ground**

Language: English

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full Professor	Srđan	Novak
Scientific-educational title	name	surname

Number of ECTS points **6**

Total number of contact hours: **75**

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	**30**
	Auditory Practice	**15**
	Laboratory Practice	
	Practicum	**30**
	Seminar	
	Field Work	

Requirements for signature to be appended

Regular attendance of lectures, seminars and laboratory exercises

Manner in which examination is taken: Written [**X**] Oral [**X**] Append X in the appropriate box

Description of module (in no more than 1200 characters):

The process in the bioreactor is completed -what then? Biomass separation (filtration, centrifugation, sedimentation, coagulation, flocculation, flotation). Overview of product separation processess from biomass and from the spent liquid medium (filtrate, supernatant).
Cells disruption. Mechanical and non-mechanical methods. Isolation of products from biomass.
Liquid- liquid exstraction.
Two phase exstraction
Precipitation and crystallization.
Adsorption.
Dialysis, ultrafiltration and reverse osmosis.
Chromatographic methods in industrial scale.
Electrophoresis and electrodialysis.
Crystallization and drying as final purifiying phases.
Validation and registration of processess in pharmaceutical industry.
Integrated processess (separation simultaneously with process in bioreactor)

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

By this module students acquire higher level of proficiency in the field of separation and purification of biotechnological products suitable to graduate study after they acquired engineering knowledge.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	V. Marić i sur. Biokemijsko inženjerstvo (Interna skripta), 1991.
2.	J.E.Bailey, D.F.Ollis, Biochemical Engineering Fundamentals, McGraw-Hill, Singapore, 1986.
3.	M. L. Shuler, F. Kargi, Biochemical Engineering - Basic Concepts (2nd edition), Prentice Hall, 2002
4.	Biotechnology, Multivolume Comprehensive Tretease, (H.J. Rehm G. Reed, A. Püchler, P.Stadler, eds.), Weinheim, New York, Basel, Cambridge, VCH, 1993.
5.	

Recommended literature

No.	Title
1.	
2.	
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full Professor	Novak	Srđan
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor	Dpt of Biochemical Engineering	Faculty of Food Technology and Biotechnology University of Zagreb

PBF employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator ☐ instructor ☐ Append X in the appropriate box

Title of curriculum module executed:

E-mail address: srnovak@pbf.hr

Address of personal web page:

Date of last review:

CV (no more than 1200 characters): I was born on Janury 3rd 1952. I graduated biotechnology studies on the Faculty of Technology, University of Zagreb in 1976. I have been working on the Faculty of Food Technology and Biotechnology, University of Zagreb since 1977 where I completed Master Thesis in 1984. and Ph.D. Thesis in 1992. I spent 15 months at the California Institute of Technology, Pasadena, California, USA and 10 months at Labatt Institute, London, Ontario, Canada. The area of my scientific interests cover biochemical engineering and microbial physiology. I attanded many scientific congresses with approximately 50 communications and I have published 28 scientific publications (16 of them are indexed in SCI). Professionally I worked on different biotechnological processes and procedures (beer production, organic acids, antibiotics, food products, waste water treatment and tretment of waste management). I am member of Croatian Academy of Engineering, Croatian Society of Biotechnology (4 years as the president, 9 years as the member of Executive Board) and some other societies. I am the member of the editorial board of few scientific journals. I am full professor since 2004.

List of relevant titles published within the last five years:

1.	M. Ivančić, B. Šantek, S. Novak, and V. Marić, Fermentative bioconversion in a horizontal rotating tubular bioreactor. Proc. Biochem. 39 (8); 995 - 1000; 2004.
2.	M. Ivančić, B. Šantek, S. Novak, P. Horvat and V. Marić, Bioprocess kinetics in a horizontal rotating tubular bioreactor. Bioprocess Biosyst. Eng. 26; 169 - 175; 2004.
3.	A. Slavica, B. Šantek, S. Novak and V. Marić, Microbial acetate oxidation in horizontal rotating tubular bioreactor. J. Biosci. 29; 169 - 177; 2004
4.	B. Šantek, P. Horvat, S. Novak, V. Marić, Kriteriji povećanja obujma bioreaktora, Kem. Ind., 53 (1); 7 - 24; 2004.
5.	S. Novak, *V. Zechner-Krpan*, V. Maric'. Regulation of maltose transport and metabolism in *Saccharomyces cerevisiae*. Food Technol. Biotechnol 42 (3), 213-218, 2004.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	B. Mayr, S. Novak, P. Horvat, F. Gaisch, M. Narodoslawsky, A. Moser, Purification of landfill leachates by means of combined biological and membrane separation treatment. Chem. Biochem. Eng. Q. 9; 39-45, 1995.
2.	B. Šantek, P. Horvat, S. Novak, A. Moser and V. Marić, Studies on mixing in horizontal rotating tubular bioreactor. Part I: Optimisation of adjustable model parameters for "spiral flow" model. Bioprocess Eng. 18 ; 467 – 473, 1998.
3.	B. Šantek, P. Horvat, S. Novak, A. Moser and V. Marić, Studies on mixing in horizontal rotating tubular bioreactor. Part II Prediction systems for adjustable parameters of "spiral flow" model. Bioprocess Eng. 19; 19 – 28, 1998.
4.	B. Šantek, P. Horvat, S. Novak, A. Moser and V. Marić, Studies on mixing in horizontal rotating tubular bioreactor. Part III: Influence of liquid level and distance between the partition walls on prediction systems for adjustable model parameters. Bioprocess Eng. 19; 91 – 102, 1998.
5.	S. Beluhan, I. Karmelić, S. Novak and V. Marić, Partial purification and biochemical characterization of alkaline 5'-phosphodiesterase from barley malt sprouts. Biotechnol. Lett. 25; 1099- 1103, 2003.

Curriculum course (subject) instructor:

Associate Professor	Božidar	Šantek
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Lectures (2 units)

E-mail address: bsantek@pbf.hr

Address of personal web page:

Date of last review: December 1st 2003.

CV (no more than 1200 characters):

Born in Ludbreg (Croatia) on May 27th, 1966. He finished primary school in Ludbreg and secondary school for chemical technician in Varaždin (1985). After army service (1986) he started the study on the Faculty of Food Technology and Biotechnology, University of Zagreb and he graduated in 1990. In 1991 he started to work as a research assistant at the Faculty of Food Technology and Biotechnology. He defended his M. Sc. Thesis in 1994 and PhD Thesis in 1996. In 1998 he was appointed for Assistant Professor at the Faculty of Food Technology and Biotechnology, University of Zagreb. From February 1st 2001 until February 1st 2002 and June 1st 2002 until December 1st 2002 he was guest researcher at University Bielefeld (Germany). On December 1st 2003 he was appointed for Associate Professor in the Department of Biochemical Engineering of the Faculty of Food Technology and Biotechnology, University of Zagreb. Until now, results of his scientific work were presented in 14 papers and at 22 posters. He was invited speaker on three scientific conferences. He speaks English and German.

List of relevant titles published within the last five years:

No.	Title
1.	B. Šantek, P. Horvat, S. Novak, D. Sunko, A. Moser and V. Marić, Estimation of axial dispersion in horizontal rotating tubular bioreactor by means of a structured model. Bioprocess Eng. 23; 265 - 274; 2000.
2.	M. Ivančić, B. Šantek, S. Novak, and V. Marić, Fermentative bioconversion in a horizontal rotating tubular bioreactor. Proc. Biochem. 39 (8); 995 - 1000; 2004.
3.	M. Ivančić, B. Šantek, S. Novak, P. Horvat and V. Marić, Bioprocess kinetics in a horizontal rotating tubular bioreactor. Bioprocess Biosyst. Eng. 26; 169 - 175; 2004.
4.	A. Slavica, B. Šantek, S. Novak and V. Marić, Microbial acetate oxidation in horizontal rotating tubular bioreactor. J. Biosci. 29; 169 - 177; 2004
5.	B. Šantek, P. Horvat, S. Novak, V. Marić, Kriteriji povećanja obujma bioreaktora, Kem. Ind., 53 (1); 7 - 24; 2004.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	T. Rezić, Dinamika procesa simultane mikrobne nitrifikacije i denitrifikacije u horizontalnom rotirajućem cijevnom bioreaktoru, magistraski rad, siječanj 2005, PBF, voditelj: dr. sc. B. Šantek, izv. prof.
2.	M. Felski, E. Flaschel, K. Friehs, B. Šantek, M. Lotz, Fermentation von *Euglena gracilis* in konditioniertem Kartoffelfruchtwasser (KFW) mit dem Ziel der Paramylon - Produktion, Chemie Ingenieur Technik, 74 (5), 2002, 600 - 601.
3.	B. Šantek, P. Horvat, S. Novak, A. Moser and V. Marić, Studies on mixing in horizontal rotating tubular bioreactor: II. Prediction systems for adjustable parameters of "spiral flow" model., Bioprocess Eng.; 19 ; 19 - 28; 1998.
4.	B. Šantek, P. Horvat, S. Novak, B. Mayr, A. Moser and V. Marić, Mathematical model of mixing in a horizontal rotating tubular bioreactor : "Spiral flow" model. Bioprocess Eng. ; 14 ; 223 - 229; 1996.
5.	B. Šantek and V. Marić, Temperature and dissolved oxygen concentration as parameters of *Azotobacter chroococcum* cultivation for use in biofertilizers, Biotechnol. Letters 17 (4); 453 - 458; 1995.

Curriculum course (subject) instructor:

Assistant Professor	Damir	Ježek
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Downstream processing

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Downstream processing

E-mail address: djezek@pbf.hr

Address of personal web page:

Date of last review: 15.02.2001.

CV (no more than 1200 characters):

Born 10.08.1966, Požega, Graduated in 1990, master's thesis, 1995, doctoral thesis, 1999
lecturer of selected chapters from the course "Transport Phenomena", "Unit Operations" on Faculty of Food & Biotechnology, University of Zagreb, head of the course "Basic of thermodynamics and technolgical operations",head of practical exercises in a/m subjects,deputy head of laboratory,Junior Asisstant, July 1994 – November 1995,Assistant, November 1995 – October 1999,Senior Assistant, October 1999 – February 2001,Assistant. Professor, February 2001 –
Members of European Society for Biotechnology, Croatian Society for Biotechnology, Croatian Systems Society (CROSS) , Croatian Society of Chemical Engineers and Technologists, Croatian Food , Biotechnology and Nutrition Club, The Society of University Teachers and Scientists of Zagreb. Associate in the project "Biopolymer degradation mechanism in the extrusion process", Head of the project "Preparing a higher education manual in food technology (F), biotechnology (B) and nutrition (N)" Head of the project "Data definition of conditions for production bread crumbs for various food product coating".

List of relevant titles published within the last five years:

red. broj	Naziv
1.	**Papeša S., Ježek D., Kujundžić D.: "Determination of sorbitol concentration in diet chocolate by high-perfomance liquid chromatography",** *Food technol. biotechnol. 39 (2) 129-133 (2001).*
2.	**Herceg Z., Lelas V., Brnčić M., Tripalo B., Ježek D.:"Fine milling and micronization of organic and inorganic materials under dynamic conditions",** *Powder Technology 139, 111-117 (2004).*
3.	**Herceg Z., Lelas V., Brnčić M., Tripalo B., Ježek D.:"Tribomechanical micronization and activation of whey protein concentrate and zeolite",** *Sadhana 29 (1), 13-26 (2004).*
4.	**Brnčić M., Mrkić V., Ježek D., Tripalo B.:** *"***Modeli reakcija za vrijeme ekstruzije pšeničnog škroba"**, *Kem. Ind. ,* **49** *(3); 101-110 (2000).*
5.	**D. Kovaček, A. Ninčević, I. Miljević, D. Vikić-Topić, M. Brnčić, D. Ćurić, B. Tripalo, D. Ježek, D. Karlović, M. Fegeš: "Utjecaj temperature na kemijske promjene tijekom postupka ekstruzije"**, *Kem. Ind.* **52** (10) 495-499 (2003).

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	• **Mechanism of biopolymer decomposition during process of extrusion** – (Project – 058202; MZT RH; 1999-2002) – active researcher • **Production extruded flour as raw material for productional bread and rolls** – TP-01/0058-02; RAZUM 2001. – active researcher • **Mechanism of controlled carbohydrate decomposition in extrusion procedures** (Project – 0058007; MZT RH; 2001-) – active researcher • **Development of a higher education web portal in Food technology (F), Biotechnology (B) and Nutrition (N)** (Project: 2002-061;2002-2003)– principal investigator • **Data definition of conditions for production bread crumbs for various food product coating** (Project: TP-03/0058-17;2004-)– principal investigator
2.	D.Ježek, D.Ćurić, D.Karlović, B.Tripalo: "Proizvodnja prehrambenih vlakana iz rezanaca šećerne repe postupkom ekstruzije",*Croatian Sugar Review*, 2 (1) 6-8 (1996), Zagreb.
3.	B.Tripalo, D.Karlović, D.Ćurić, D.Ježek: "Pad tlaka u nasutom sloju", *Croatian Sugar Review*, 3 (1) 22-23 (1997), Zagreb.
4.	author of internal book for student`s exercises for "Unit operations" , author of internal digital book on croatian and english for " Basic of thermodynamics and technolgical operations" on web site www.pbf.hr/edukacija, and on the web site www.pbf.hr/djezek. with interactive capability for exams exercises via internet.
5.	participate in leadership of one master's thesis and 13 graduate work with applications of various unit operations in food industry and biotechnology

I. BASIC DATA ON PROPOSED MODULE

Name of module: **METHODOLOGY OF SCIENTIFIC WORK AND INTELLECTUAL PROPERTY PROTECTION**

Core course of studies for module: **GRADUATE STUDY OF BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [x] Append X in the appropriate box

Academic year in which module appears (semester): 1 / II

Module status: Ground, ElectiveA, Elective B Ground

Language: English

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full Professor (permanent status)	**Jasna**	**Kniewald**
Scientific-educational title	name	surname

Number of ECTS points 4

Total number of contact hours: 50

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	20
	Auditory Practice	
	Laboratory Practice	
	Practicum	15
	Seminar	15
	Field Work	

Requirements for signature to be appended

Full attendance to lectures, seminars and successfully finished practice.

Manner in which examination is taken: Written [x] Oral [x] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Module comprise the knowledge of importance and significance of scientific work and of categories and methods of scientific research. Acquirement of usage scientific publications: primary, secondary and tertiary, with accentuation on the possibilities of computer aided literature searching. Examples will be explained and strategies in searching bibliographic, full-text, citation and patent information databases will be practised within seminars and practicum. Introduction to fundamentals of modern patent system: patent law, procedures and commercial usage of patents. From selection of theme to defence of master degree thesis: planning and performing experiments, approaching to elaboration of results, writing thesis. Preparation of manuscript of scientific paper and drafting the scientific project proposal will be elaborated within lectures and seminars through variety of examples. Areas of science and criteria for acquiring scientific degrees, scientific-educational and collaborative titles. Valuation in science: valuation of scientific work and scientific publication, of scientist and collaborators.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Module qualify student for independent approach to performing master degree thesis. Student acquires knowledge in searching relevant literature, planning experiments, approaching to elaboration of results and writing thesis.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	Kniewald, J. (1993) [*Methodology of Scientific Work*] (university course book), Multigraf, Zagreb. (Croatian)
2.	Jakominić, M., Šimić, B., Kniewald, J. (1999) [*Handbook for electronic literature searching*] (reviewed internal course book), Faculty of Food Technology and Biotechnologyt, Zagreb. (Croatian)
3.	Grubb, P. W. (1999) *Patents for Chemicals, Farmaceuticals and Biotechnology.* Flarendon Press, Oxford.
4.	
5.	

Recommended literature

No.	Title
1.	Harnack, A., Kleppinger, E. (2003) *Online : a reference guide to using internet sources.* <http://www.bedfordsmartins.com/online/citex.html>
2.	Group of authors (1996) *Protecting Biotechnological Inventions - Recent Development in Law and Practice in EC and USA*, IBC Technical Series, London.
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full Professor (permanent status)	**Jasna**	**Kniewald**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor	Faculty of Food Technology and Biotechnology, University of Zagreb, Department of Chemistry and Biochemistry

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:	**METHODOLOGY OF SCIENTIFIC WORK AND INTELLECTUAL PROPERTY PROTECTION (DBI06)**
E-mail address:	jkniewal@pbf.hr
Address of personal web page:	http://www.pbf.hr/jkniewal
Date of last review:	October 26, 1995
CV (no more than 1200 characters):	Born in Zagreb, Croatia, June 24, 1938. Croatian national. **Educ:** F. of Technol. - Dpt. of Biotechnology, U. of Zagreb, 1962; F. of Technol., U. of Zagreb, Ph.D. Chem. Sci., 1965; Postgrad. study Inst. for Pharmacol. Invest. Mario Negri, Milan, Italy, 1969-70. **Empl.** and **Elect. (E):** Inst. for Physical. Chem. U. of Zagreb, 1962-75, Assistant and Sci. Assistant, E. 1972; F. of Technol. U. of Zagreb 1975-80, Sen. Sci. Assoc., E. 1978; F. of Food Technol. and Biotech. U. of Zagreb, 1980-today, E. Sci. Counsel., E. 1986, E. Full Prof. 1988 and Perm. Full Prof. 1995 in biotechnical sci., biotechnology. **Sci. papers**: ISI citation >300x, CC sci. papers >30, other papers >35. Coordinator of courses at graduate studies at F. of Food Technol. and Biotechnol, U. of Zagreb and at postgraduate studies at F. of Food Technol and Biotechnol., F. of Sci. and F. of Pharm. and Biochem., U. of Zagreb (*Introduction to Scientific Work, Methodology of Scientific Work, Food Toxicology, Toxicological Aspects of Food Processing, Basic Toxicology, Biochemical Mechanisms of Toxicity*). **Memb.:** Eur. Soc. of Toxicol. - Educ. Sub-Committee; Croat. Toxicol. Soc., Memb. of Presidency 1992-today; Croat. Soc. of Biotech.; Croatian Acad. of Engineer., Memb. Assoc. 1994, Full Memb. 1998; Expert at Europ. Comm. for evaluation FW6 projects, May 2003, Brussels; New York Acad. of Sci. 2000; President of Sc. Comm. of 3 CROTOX Sci. Conf. 1996-2004; Coordin. and organ. of EUROTOX Basic Toxic. Course 2004; Memb. of Editorial Board for Proc. of 3 Sci. Conf.

List of relevant titles published within the last five years:

No.	Title
1.	Kniewald, J., Jakominić, M., Tomljenović, A., Šimić, B., Romac, P. Vranešić, Đ., Kniewald, Z.: Disorders of male reproductive tract under the influence of atrazine. *J. Appl. Toxicol.* **20** (2000) 61-68.
2.	Kniewald, J.: [Pesticides and environment – presence and risks] *Kem. Ind.* **50** (2001) 343-350. (Croatian)
3.	Kniewald, J.: Risk evaluation from pesticide residues in food. In: *Current Studies of Biotechnology, Vol.3 - Food* (Kniewald, Z. *et al*, eds.), Croatian Society of Biotechnology, Zagreb (2001) pp.149-159.
4.	Kmetič, I., Gaurina-Srček, V., Šimić, B., Kniewald, Z., Kniewald, J.: Cytotoxic effects of organochlorine insecticides in Baby Hamster Kidney (BHK 21 C13) cell line. In: *Current Studies of Biotechnology, Vol.3 - Food* (Kniewald, Z. *et al*, eds.), Croatian Society of Biotechnology, Zagreb (2003) pp.177-184.
5.	Kniewald, J., Kmetič, I., Gaurina-Srček, V., Kniewald, Z.: Alternative models for toxicity testing of xenobiotics. *Arh. Hig. Rada Toksikol.* **56** (2005) (in press)

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Kniewald, J. (1993) [*Methodology of Scientific Work*] (university course book), Multigraf, Zagreb. (Croatian)
2.	Jakominić, M., Šimić, B., Kniewald, J. (1999) [*Handbook for electronic literature searching*] (reviewed internal course book), Faculty of Food Technology and Biotechnologyt, Zagreb. (Croatian)
3.	[International Patent Classification (IPC), Seventh Edition (1999); Vol. 3 (Section C); Chemistry, Metallurgy (Section C Editor Z. Kniewald)] ISBN 953-6513-23-4, 2001. (Translation in Croatian)
4.	Lectures in PowerPoint presentation for course *Introduction to Scientific Work* on under-graduate study and for *Methodology of Scientific Work* on post-graduate study, Faculty of Food Technology and Biotechnology, University of Zagreb. .
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full Professor (permanent status)	**Zlatko**	**Kniewald**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor	Faculty of Food Technology and Biotechnology, University of Zagreb, Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed:	**METHODOLOGY OF SCIENTIFIC WORK AND INTELLECTUAL PROPERTY PROTECTION (DBI06)**
E-mail address:	zlatko.kniewald@pbf.hr
Address of personal web page:	http://www.pbf.hr/knic
Date of last review:	October 26, 1995
CV (no more than 1200 characters):	Born in Zagreb, Croatia, June 2, 1938. Croatian national. **Educ:** F.of Technol. – Dpt. of Biotechnology, U. of Zagreb, 1961; F. of Pharm. & Biochem. Zagreb, M. Sc. Phys. Chem, 1966; F. of Technol., U. of Zagreb, Ph. D. Biotech. Sci., 1970; Postgrad. study Inst. of Pharmacol., Milan, Italy, 1968-70; U. of Manchester, England, 1991, Semin. "Manag. res. in higher educ."; U. of Southampton, England, 1995, Semin. "Ind. and higher educ.: Working together". **Empl:**. "Žumberak" Fact., Savski Marof, 1961-65; Lab. for Exp. Med., Zagreb, 1965-75; Rep. Counc. for Scient. Work of the Soc. Rep. of Croatia, Zagreb, 1972-74; Rep. Comm. for Scient. Work of the Soc. Rep. of Croatia, Secretary-General, 1975-80; Fac. of Food Technol. and Biotechnol., 1980. **Elected (E.)** Assist. in the Lab. for Exp. Med, Zagreb, 1965; "Ruđer Bošković" Institute, E. Sen. Sci. Assoc., 1977; Facult. of Food Technol. and Biotechnol., E. Sci. Counsel., 1980; E. Full Prof. 1987, eval. for Full Prof. 1993, E. Perm. Full Prof., 1995. **ISI citation** < 600, CC sc. papers < 40, other pap. < 95, 1 reg. patent, 1 reg. industr. designs. **Memb.:** Croat. Soc. of Biotech., Soc. Study of Reprod., USA, Sci. Counc. for Agricult. and For. of the Croat. Acad. of Sci. and Arts, Croat. Acad. of Eng., Full Memb. and Presid. (2003-05, 2005- 2nd mand.); The World Innov. Found., England, Hon. Mem., 2004, Croat. Eng. Assoc., Zagreb, Mem. of the Gov. Board, Biotech. Found. of the Fac. of Food Tech.. and Biotechn.., Zagreb, Manager. **Awards:** The "Ruđer Bošković" Ann. Award. for Sci. Work grant. by the Parliam. of the Soc. Rep. of Croatia, 1986, Med. of Lab. with Gold. Wreath, 1986; Fac. of Food Tech. and Biotech. Ann. Aw., 2001/02.

List of relevant titles published within the last five years:

No.	Title
1.	Z. Kniewald, V.Gaurina-Srček (2000): The effect of new growth promoter CABRPP on biomass production of BHK21 C13 cells. Current Studies of Biotechnology vol. I. Biomedicine (Z. Kniewald, ed.), Croatian Society of Biotechnology, Zagreb pp 61-68,
2.	A. Tomljenović, V. Zechner-Krpan, Z. Kniewald (2000): Hypothalamo-pituitary-ovarian axis in rats under the influence of gonadoliberin or atrazine. Current Studies of Biotechnology vol.I. Biomedicine (Z. Kniewald, ed.), Croatian Society of Biotechnology, Zagreb, pp 69-74.
3.	A. Jeličić, V. Gaurina-Srček, D. Polančec, D. Sladić, Z. Kniewald (2001) Induction and detection of apoptosis in BHK21 C13 cells. Current Studies of Biotechnology vol.II. Environment (Z.Kniewald, ed.) Croatian Society of Biotechnology, Zagreb.
4.	Kniewald, J., Jakominić, M., Tomljenović, A., Šimić, B., Romac, P., Vranešić, Đ., Kniewald, Z.: Disorders of male reproductive tract under the influence of atrazine. *J. Appl. Toxicol.* **20** (2000) 61-68.
5.	V. Gaurina Srček, S. Čajavec, D. Sladić, Z. Kniewald: BHK 21 C13 cells for Aujeszky's disease virus production using the multiple harvest process. Cytotechnology (2004) – in press

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	[International Patent Classification (IPC), Sixth Edition (1994); Vol. 3 (Section C); Chemistry, Metallurgy (Section C Editor Z. Kniewald)] ISBN 953-6513-09-9, 1998. (Translation in Croatian)
2.	[International Patent Classification (IPC), Seventh Edition (1999); Vol. 3 (Section C); Chemistry, Metallurgy (Section C Editor Z. Kniewald)] ISBN 953-6513-23-4, 2001. (Translation in Croatian)
3.	Lectures in PowerPoint presentation for course *Intellectual Property Protection* on post-graduate study, Faculty of Food Technology and Biotechnology, University of Zagreb.
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Associate Professor	**Branimir**	**Šimić**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor	Faculty of Food Technology and Biotechnology, University of Zagreb Department of Chemistry and Biochemistry

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [x] Append X in the appropriate box

Title of curriculum module executed:	**METHODOLOGY OF SCIENTIFIC WORK AND INTELLECTUAL PROPERTY PROTECTION (DBI06)**
E-mail address:	brasim@pbf.hr
Address of personal web page:	
Date of last review:	8 July, 2003
CV (no more than 1200 characters):	Branimir Šimić, born on 24 March 1948 in Osijek, Croatia, received B. Sc. diploma from Faculty of Pharmacy and Biochemistry, University of Zagreb in 1973. The degree of Master of Chemical Sciences he acquired from Centre for Postgraduated Studies, University of Zagreb in 1979. Ph. D. degree in Medical Sciences, field Pharmacy, he achieved in 1995. In 2003. he was elected as Associate Professor in Biomedicine and Health, field Pharmacy, science of Pharmacy and Toxicology. Currently he is employee at the Faculty of Food Technology and Biotechnology, University of Zagreb, contributing in performance of education and of preparing teaching materials for courses *Introduction to Scientific Work* (since 1989), *Food Toxicology* (since 1992) and *Basic Toxicology* (since 1999). He published 23 scientific works (9 cited in CC), two textbooks for students, and participated with 55 communications at scientific congresses. He was member of Scientific Committee of 4 scientific congresses concerning fields of toxicology and biotechnology and a member of editorial boards of 2 conference proceeding publicaations. B. Šimić was engaged in organization and participated in performance of the international educational course for young scientists *EUROTOX Basic Toxicology Course – Croatia 2004*. He is the member of Presidency of Croatian Society of Toxicology and member of Croatian Society of Biotechnology.

List of relevant titles published within the last five years:

No.	Title
1.	Kniewald, J., Jakominić, M., Tomljenović, A., Šimić, B., Romac, P., Vranešić, Đ., Kniewald, Z.: Disorders of male reproductive tract under the influence of atrazine. *J. Appl. Toxicol.* **20**, (2000) 61-68.
2.	Jakominić, M., Jeličić, A., Šimić, B., Kniewald, J.: Effects of atrazine on 5α-dihydrotestosterone regulated meshanisms in rat prostate nuclei. In: *Current Studies of Biotechnology, Vol. 1. – Biomedicine* (Kniewald, Z. *et al*, eds.), Croatian Society of Biotechnology, Zagreb (2000) pp. 51-59.
3.	Šimić, B., Jakominic, M., Romac, P., Kniewald, J.: Effect of atrazine on sperm parameters in rats. In: *Current Studies of Biotechnology, Vol. 2. - Environment* (Kniewald, Z. *et al*, eds.), Croatian Society of Biotechnology, Zagreb (2001) pp. 195 - 201.
4.	Kmetič I., Gaurina-Srček, V., Šimić, B., Kniewald, Z., Kniewald, J.: Cytotoxic effects of organochlorine insecticides in Baby Hamster Kidney (BHK 21 C13) cell line. In: *Current Studies of Biotechnology, Vol. 3. - Food* (Kniewald, Z., ed.), Medicinska naklada / Croatian Society of Biotechnology, Zagreb (2003) pp. 177 - 184.
5.	Bilandžić, N., Žurić, M., Lojkić, M., Šimić, B., Milić, D., Barač, I.: Cortisol and immune measures in boars exposed to three-day administration of exogenous adrenocorticotropic hormone. *Vet. Res. Commun.* **29** (2005) – in press

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Jakominić, M., Šimić, B., Kniewald, J. (1999) [*Handbook for electronic literature searching*] (reviewed internal course book), Faculty of Food Technology and Biotechnologyt, Zagreb. (Croatian)
2.	
3.	
4.	
5.	

I. BASIC DATA ON PROPOSED MODULE

Name of module: **BIOCHEMICAL ANALYTICS**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): **1/II**

Module status: Ground, Elective A, Elective B **Elective A**

Language: English

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full Professor	**Vladimir**	**Mrša**
Scientific-educational title	name	surname

Number of ECTS points 6

Total number of contact hours: 75

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	30
	Auditory Practice	
	Laboratory Practice	45
	Practicum	
	Seminar	
	Field Work	

Requirements for signature to be appended

regular attendance of lectures and practical courses

Manner in which examination is taken: Written [ ] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Lectures: Chemical and physico-chemical assays of macromolecules: Proteins. Carbohydrates. Lipids. Nucleic acids. Assays of activity and biological effect of macromolecules. Quantitative analysis using enzymes, examples. Methods for testing integrity of biomacromolecules. Analytical methods applicable in living cells. Cell counting. Immunochemical methods. Quantitative analysis using polymerase chain reaction (PCR). Strategy in following biotechnology processes by biochemical methods.
Practical courses: Different protein assays. Carbohydrate assays. Lipid assays. Nucleic acids assays. Application of enzymic tests for quantitative analysis. RIA. ELISA. Immunoblot. "Real-time" PCR. Implementation of biochemical analytics in biotechnology processes.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Acquirement of practical knowledge and skills in using different biochemical methods for following and evaluating biotechnology processes.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	L. Stryer, *Biokemija*, Školska knjiga, Zagreb, 1991.
2.	
3.	
4.	

5.	

Recommended literature

No.	Title
1.	*Guide to protein purification* (Deutscher M.P. ured.) Methods in Ezymology 182, Academic Press Inc., San Diego, 1990.
2.	
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full Professor	**Vladimir**	**Mrša**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Chemistry and Biochemistry, Laboratory of Biochemistry

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: Biochemical analytics

E-mail address: vmrsa@pbf.hr

Address of personal web page:

Date of last review: 26. 2. 2005.

CV (no more than 1200 characters):

V. Mrša was born in Zagreb in 1957. In 1975 he enrolled Biotechnology Department, Faculty of Technology in Zagreb where he graduated in 1980. In the same year he enrolled postgraduate study at the Faculty of Science in Zagreb, Chemistry/Biochemistry. In 1984 he defended hid dissertation at the Faculty of Food Technology and Biotechnology in Zagreb. From 1988 to 1990 he was a visiting scientist at the Laboratory for cell biology, University of Regensburg, Germany, after which he stayed in the same Laboratory several times. From 1980 V. Mrša was research assistant in the Laboratory of Biochemistry, Faculty of Food Technology and Biotechnology in Zagreb. In 1990 he was elected Docent, in 1996 Associate professor, and in 1999 Professor.

V. Mrša organises and performs different courses at the Faculty of Food Technology and Biotechnology. Besides, he performs courses in postgraduate studies of Nutrition (PBF), Chemistry (PMF) and at the Veterinary Faculty. He was mentor to 17 diploma works and 3 master theses.

V. Mrša published 32 papers (24 indexed in CC). He was invited lecturer at different domestic and international congresses. Besides, V. Mrša participated in organisation of more scientific meetings.

V. Mrša is a member of Croatian Society for Biochemistry and Molecular Biology, Croatian Society for Biotechnology and Croatian Microbiological Society. 1992-1997 he was the president of IAESTE-Croatia. Since 2003 V. Mrša is the dean of the Faculty of Food Technology and Biotechnology.

List of relevant titles published within the last five years:

No.	Title
1.	D. Kokanj and V. Mrša (2001) *Localisation and physiological role of Saccharomyces cerevisiae cell wall proteins*, Period. Biol. 103, 123-133.
2.	D. Kokanj and V. Mrša (2001) *Localisation of yeast cell wall proteins. in Curr. Studies Biotech. vol.2.* (ed. Z. Kniewald) pp. 157-166.
3.	M. Ecker, V. Mrša, I. Hagen, R. Deutzmann, S. Strahl, and W. Tanner (2003) *O- Mannosylation precedes and potentially controls the N-glycosylation of a yeast cell wall glycoprotein*, EMBO Reports 4, 628-632.
4.	R. Teparić, I. Stuparević and V. Mrša (2004) *Increased mortality of Saccharomyces cerevisiae cell wall protein mutants*, Microbiology 150, 3145-3150.
5.	J. Frece, B. Kos, I. K. Svetec, Z. Zgaga, V. Mrša and J. Šušković (2005) *Importance of S-layer proteins in probiotic activity of Lactobacillus acidophylus M92*, J. App. Microbiol. 98, 285-292.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	R. Teparić and V. Mrša (1997) Purification of yeast periplasmic proteins using protein adsorption to glucan, *Food Technol. Biotechnol.* **35**, 29-32.
2.	V. Mrša, T. Seidl, M Gentzsch and W. Tanner (1997) Specific labeling of cell wall proteins by biotinylation. Identification of four covalently linked O-mannosylated proteins of *Saccharomyces cerevisiae*, *Yeast* **13**, 1145-1154.
3.	J. Frece, B. Kos, I. K. Svetec, Z. Zgaga, V. Mrša and J. Šušković (2005) *Importance of S-layer proteins in probiotic activity of Lactobacillus acidophylus M92*, J. App. Microbiol. **98,** 285-292.
4.	Supervisor of seventeen diploma, three master and one Ph.D. thesis.
5.	Author/coauthor of laboratory practice manual for Biochemistry I, Biochemistry II

Curriculum course (subject) instructor:

Full Professor	**Slobodan**	**Barbarić**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Chemistry and Biochemistry, Laboratory of Biochemistry

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Biochemical analytics

E-mail address: sbarbari@pbf.hr

Address of personal web page:

Date of last review: 05.10.1999.

CV (no more than 1200 characters):

Date and place of birth: 24.05.1949, Zagreb, Croatia

Education:

1973. Bachelor degree; 1976. Master degree; 1979. Ph.D. in Biochemistry, University of Zagreb

Professional career:

1974-1976. Assistant
1976-1981. Scientific Assistant
1981-1986. Assistant Professor
1986-1988. Associated Professor
1988- Full Professor, all in at Faculty of Food Technol. and Biotechnology, University of Zagreb
1979-1980. Postdoctoral fellow, *ETH*, Zurich
1988-1990. Alexander Von Humboldt-Stiftung fellow, *Universitaet Muenchen*, Muenchen
1994-1996. Guest Scientist, *Universitaet Muenchen*, Muenchen

Scientific and professional activity:

- Chromatin remodeling and transcriptional regulation in yeast
- About 50 papers in international journals, books and proceedings (mainly indexed in CC/SCI). More than 800 citations in CC
- Member of scientific and/or organising committee on several international scientific meetings.
- Invited speaker or chairman on several international meetings and courses:
- Participation with free communication on about 100 international or national meetings

Duties in professional organisation:

1983-1987 general secretary of The Federation of Biochemical Societies of Yugoslavia
1989-1993 member of *The Advanced Course Committee*, The Federation of European Biochemical Societies
1997-2001 member of the Presidency of Croatian Biochemical Society

List of relevant titles published within the last five years:

No.	Title
1.	Münsterkötter, M., Barbarić, S. and Hörz, W. *Transcriptional regulation of the yeast PHO8 promoter in comparison to the coregulated PHO5 promoter*. J. Biol. Chem. 275 (2000) 22678-22685.
2.	Gregory, P. D., Barbarić, S. and Hörz, W. *Transcriptional control of phosphate-regulated genes in yeast: the role of specific transcription factors and chromatin remodeling complexes in vivo.* Food Technol. Biotechnol. 38 (2000) 295-303.
3.	Barbarić, S., Walker, J., Schmid, A., Svejstrup, J. Q. and Hörz, W. *Increasing the rate of chromatin remodeling and gene activation-a novel role for the histone acetyltransferase Gcn5.* EMBO J. Vol.20 No.17 (2001) 4944-4951.
4.	Barbarić, S., Reinke H. and W. Hörz. *Multiple Mechanistically Distinct Functions of SAGA at the PHO5 Promoter.* Mol. Cell. Biol. 23 (2003) 3468-3476.
5.	Barbarić, S., Reinke H. and W. Hörz. *Mechanism of chromatin remodeling and transcriptional regulation: lessons from the yeast PHO5 promoter.* Period. Biol. 106 (2004) 87-94.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Gregory, P. D., Barbarić, S. and Hörz, W. *Restriction nucleases as probes for chromatin structure.* In: Methods in Molecular Biology (ed. P. B. Becker), The Humana Press Inc. Totowa, New Jersey (1999) 417-425.
2.	Barbarić, S., Münsterkötter, M., Goding, C. and Hörz, W. *Cooperative Pho2-Pho4 interactions at the PHO5 promoter are critical for binding of Pho4 to UASp1 and for efficient transactivation by Pho4 at UASp2*. Mol. Cell. Biol. 18 (1998) 2629-2639.
3.	Reljić, R., Barbarić, S., Ries, B., Buxton, R. and Hughes, R. *Expression, glycosylation and secretion of yeast acid phosphatase in hamster BHK cells*. Glycoconjugate J. 9 (1992) 39-44.
4.	Author/coauthor of laboratory practice manual for Biochemistry I, Biochemistry II and Molecular Biology, published in part in ″Biochemical Education″ journal (Barbarić, S. and Ries, B. *Yeast acid phosphatase in student laboratory*. Biochem. Educ. 16 (1988) 230-231.)
5.	Supervisor of many diploma, six master and one Ph.D. thesis.

Curriculum course (subject) instructor:

Senior research associate	**Bojan**	**Benko**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: State Intellectual Property Office

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Biochemical analytics

E-mail address: bbenko@vodatel.hr

Address of personal web page:

Date of last review: 27. 12. 1999.

CV (no more than 1200 characters):

Education:

1968-1973. Study of chemistry, Faculty of sciences and mathematics, Zagreb

1973-1976. Postgraduate study of structural biophysics

1976. Acquired Ph. D. degree in chemistry

Postdoctoral study:

Department of Chemistry, Georgia Institute of technology, Atlanta, USA (1981-1982) – research of the structure and function of hemoproteins using Raman spectroscopy.

Employment:

Institute of Biology, Zagreb University; Institute of Immunology, Zagreb; State Intellectual Property Office of the Republic of Croatia

Graduate courses:

Practice of biophysics (1979-1983); Introduction in biophysics, Molecular biology and biophysics (1984-1991), Faculty of Science and Mathematics, University of Zagreb

Postgraduate courses:

Spectroscopic methods in biochemistry (1986-1990), Faculty of Science and Mathematics, University of Zagreb; Laboratory methods (1987-1989), Medical school, University of Zagreb; Immunochemistry (2003), Faculty of Science and Mathematics, University of Zagreb.

Mentorship:

I was a mentor of 6 B. Sc. theses, 3 M. Sc. theses and 2 Ph. D. theses (one is still in process).

Professional duties:

Blood plasma fractionation – manufacturing, R&D (biotechnology, pharmaceutical production); several executive positions

I published 42 articles (34 CC), which have been cited over 400 times. I also participated in about 80 scientific conferences, in the country and abroad.

List of relevant titles published within the last five years:

No.	Title
1.	**S. Dodig, I. Čepelak, B. Benko, M. Raos, K. Branović. *Bisalbuminemia in Two Croatian Families*. Arch. Med. Res., 31(6) (2000) 608-612.**
2.	**Z. Turk, S. Ljubić, N. Turk, B. Benko. *Detection of Autoantibodies against Advanced Glycation Endproducts and AGE-Immune Complexes in Serum of Patients with Diabetes Mellitus.* Clin. Chim. Acta, 303(1-2) (2001) 105-115.**
3.	**A. Vrdoljak, A. Treščec. B. Benko, D. Hećimović, M. Šimić. *In Vitro Glycation of Human Immunoglobulin G*. Clin. Chim. Acta, 345(1-2) (2004) 105-111.**
4.	**A. Vrdoljak, A. Treščec. B. Benko, M. Šimić. *A Microassay for Measurement of F_c Function of Human Immunoglobulin Preparations using Tetanus Toxoid as Antigen.* Biologicals, 32(2) (2004) 78-83.**
5.	**U. Kragh-Hansen, M. Campagnoli, S. Dodig, H. Nielsen, B. Benko, M. Raos, R. Cesati, A. Sala, M. Galliano, L. Minchiotti. *Structural Analysis and Fatty Aacid-Binding Properties of Two Croatian Variants of Human Serum Albumin.* Clin. Chim. Acta, 349(1-2) (2004) 105-112.**

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	**B. Benko, V. Buljan, S. Vuk-Pavlović. *Concentration-Dependent Proton Magnetic Cross Relaxation in Aqueous Polyoxyethylene Solutions.* J. Phys. Chem., 84 (1980) 913-916.**
2.	**Y. Blatt, B. Benko, I. Pecht, S. Vuk-Pavlović. *Proton Magnetic Resonance Relaxation in Pseudomonas aeruginosa Cytochrome Oxidase Solutions.* J. Biol. Chem., 256(5) (1981) 2297-2301.**
3.	**B. Benko, N.-T. Yu. *Resonance Raman Studies of Nitric Oxide Binding to Ferric and Ferrous Hemoproteins: Detection of Fe(III)-NO Stretching, Fe(III)-N-O Bending and Fe(II)-N-O Bending Vibrations*. Proc. Natl. Acad. Sci. U.S.A., 80(22) (1983) 7042-7046.**
4.	**N.-T. Yu, B. Benko, E. A. Kerr, K. Gersonde. *Iron-Carbon Bond Lengths in Carbonmonoxy and Cyanmet Complexes of the Monomeric Hemoglobin III from Chironomus thummi thummi: A Critical Comparison between Resonance Raman and X-Ray Diffraction Studies.* Proc. Natl. Acad. Sci. USA, 81(16) (1984) 5106-5110.**
5.	**Z. Turk, R. Mesić, B. Benko. *Comparison of Advanced Glycation Endproducts on Haemoglobin (Hb-AGE) and Haemoglobin A_{1c} for Assesment of Diabetic Control.* Clin. Chim. Acta, 277(2) (1998)159-170.**

Curriculum course (subject) instructor:

	Branko	**Kozulić**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Biochemical analytics

E-mail address: branko.kozulic@bluewin.c

Address of personal web page:

Date of last review: 1988, "Oberassistent" Institute of Biotechnology, ETH Zurich

CV (no more than 1200 characters):

Personal Born in 1953 in Zadar

Degrees University of Zagreb, Faculty of Natural and Mathematical Sciences, B.S., 1976., Major: Biochemistry, Minor: Organic Chemistry
University of Zagreb, Ph.D., 1979

Positions

1977-1979 Research scientist, ″Podravka″ (Food and Pharmaceutical Company), during the work on the Ph.D. Thesis in the Laboratory of Biochemistry, Faculty of Food Technology and Biotechnology, University of Zagreb.
1980-1983 Head of protein purification lab, Research and Development Institute, Podravka.
1983 Post-Docoral feelow at the Department of Biotechnology, Swiss Federal Institute of Technology (ETH), Zürich.
1984-1985 Assistant at the Department of Biotechnology, Swiss Federal Institute of Technology (ETH), Zürich.
1986-1988 "Oberassistent'' at the Department of Biotechnology, Swiss Federal Institute of Technology (ETH), Zürich.
1988-1994 Co-founder and R & D Director of ″Elchrom AG″, Cham, Swiss.
1994-1997 Vice President R & D, ″Guest Elchrom Scientific AG″, Cham, Swiss
1988 R&D Director ″Elchrom Scientific AG″, Cham, Swiss,.
1999-2000 CEO and R&D Director ″Elchrom Scientific AG″, Cham, Swiss.
2000-2003 Chief Scientific Officer ″Elchrom Scientific AG″, Cham, Swiss.
2004 - Consultant
1986-1995 Member of Editorial board of Analytical Biochemistry

Scientific activity

About 30 papers in international journals, books and proceedings (mainly indexed in CC/SCI).
Several invited lectures at international meetings.
Author/coauthor of sixteen US Patents.

List of relevant titles published within the last five years:

No.	Title
1.	Kozulic, B. Method and apparatus for recovering target molecules from a gel containing said target molecules, US Patent Application 2004/0178073 (published Sep. 16, 2004)
2.	Kozulic, B. Gel cutting and recovering device, US Patent 6,565,728 (2003)
3.	
4.	
5.	

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Leisola, M.S.A., Kozulic, B., Meussdoerffer, F., and Fiechter, A. (1987) *Homology among multiple extracellular peroxidases from Phanerochaete chrysosporium*, J. Biol. Chem. 262, 419-424
2.	Kozulic, B. (1995) *Models of gel electrophoresis.* Anal. Biochem., 231, 1-12
3.	Kozulic, B. *Cross-linked linear polysaccharide polymers as gels for electrophoresis*, US Patent 5,541,255
4.	Kozulic, B. (1995) *Gel electrophoresis of DNA and proteins: Recent advances in theory and practical applications*, in Molecular Biology: Current Innovations and Future Trends (A.M. Griffin and H.G. Griffin, Eds.), Horizon Scientific Press, Wymondham, UK
5.	Supervisor of two Ph. D. thesis (ETH, Zürich)

I. BASIC DATA ON PROPOSED MODULE

Name of module: **BIOCHEMICAL ENGINEERING AND BIOPROCESS TECHNIQUES**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): **1/II**

Module status: Ground, ElectiveA, Elective B **Ground**

Language: German

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Associate Professor	Predrag	Horvat
Scientific-educational title	name	surname

Number of ECTS points 8

Total number of contact hours: 105

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	30
	Auditory Practice	
	Laboratory Practice	
	Practicum	45
	Seminar	30
	Field Work	

Requirements for signature to be appended

Finished lectures, practicum and seminar

Manner in which examination is taken: Written [X] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

During this module, students will study: processes of mass, momentum and heat transfer, processes in boundary layers around solid particles, processes in liquid films, gas solubility and mass transfer from gaseous to liquid phase in industrial bioreactors, stirred tank reactors, bubble columns, loop reactors, fluidised and packed bed reactors, reactors with convex mixing (for anaerobic processes) and bioprocess scale-up methods. During practicum, students will learn to determine biomass concentration, oxygen electrode parameters, volumetric oxygen transfer coefficient, oxygen transfer rate, specific oxygen consumption rates for various microorganisms, mixing time, circulation time and homogenisation time in bioreactors, operation characteristics of bioreactors (stirred tank reactors, bubble columns, air-lift reactors, fluidised and packed bed reactors, tubular reactors). Batch and continuous biomass cultivation will be carried out on different limiting substrates (C, N and P sources). During seminars students will calculate mass, heat and momentum transfer balances in homogeneous and non-homogeneous systems (both for steady and non-steady state) for standard process apparatus and previously mentioned bioreactors.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Students will acquire knowledge and skils of development, conduction, control and design of industrial bioprocesses and scale-up of bioprocesses.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	Biotechnology, (H.J. Rehm and G. Reed, eds.), Vol. 2, (vol.ed. H. Brauer),VCH, Weinheim,1985.
2.	A. Moser: Bioprocess Technology, Kinetics and Reactors, Springer Verlag, New York, Wien, 1988.
3.	Biotechnology, Multivolume Comprehensive Tretease, (H.J. Rehm G. Reed, A. Püchler, P.Stadler, eds.), Vol. 4, (vol.ed. K. Schügerl), Weinheim, New York, Basel, Cambridge, VCH, 1993.
4.	P.M.Doran: Bioprocess Engineering Principles, Academic Press, 1998.
5.	

Recommended literature

No.	Title
1.	H.W. Blanch, D.S. Clark: Biochemical Engineering, Marcel Dekker Inc. 1997.
2.	M. L. Shuler, F. Kargi: Biochemical Engineering - Basic Concepts (2nd edition), Prentice Hall, 2002
3.	Moo Young, (ed).,Comprehensive Biotechnology, Pergamon Press 1985
4.	N.W.F Kossen; N.M.G. Oosterhuis: Modelling and scale-up of bioreactors, Biotechnology 1985.
5.	Student može koristiti bilo koji sveučilišni udžbenik iz tog područja koji se koristi na tehničkim sveučilištima u USA, Kanadi ili zapadnoj Europi

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Associate Professor	Predrag	Horvat
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:	Lectures (10 units), practicum and seminar
E-mail address:	phorvat@pbf.hr
Address of personal web page:	
Date of last review:	December 18th 2001.
CV (no more than 1200 characters):	He was born in 1953. in Jurčevac (District of Međimurje). He completed elementary school in 1967 and high school in 1971 in Varaždin. He graduated at Department of Biotechnology, Faculty of Technology, at University of Zagreb in 1976 acquiring the degree of the Bachelor of Science. He obtained Masters degree in 1983, and Doctoral degree in 1989 at Faculty of Food Technology and Biotechnology, University of Zagreb. He worked on constructing of the Yeast Factory and the Polyester fibbers Factory and as well during production at the Yeast Factory and the Institute of security, conflagration protection and human environment safety as Technical manager. He was advisor for projecting and supervision of bioprocess facilities at companies ASA and Tepro-BWT, Austria. Since 1986. works at Faculty of Food Technology and Biotechnology as assistant, docent and associated professor (Field of Biochemical Engineering and Industrial Microbiology). He participated in UNESCO-IBRN seminar. As postdoctoral fellow RZ Alpe-Adria he resided at TU Graz where he became scientific researcher (Austrian-French project "Mixing and Bioreactors Performance"), and researcher at "Institut fuer Biotechnologie und Bioprozesstechnik", "Institut fuer Grundlagen der Verfahrenstechnik" and "Institut fuer Ressourcenschonende und Nachhaltige Systeme". Today Prof. Predrag Horvat is lecturer of Biochemical Engineering and Kinetics of Processes in Biotechnology.

List of relevant titles published within the last five years:

No.	Title
1.	G. Braunegg, R. Bona, P. Horvat: Study On Potential Routes For Acrylamide Synthesis And/Or Synthesis Of Precursors, 1-55. (2004) (Review, 55 pages, 95 references, elaborated under the contract for CIBA Basel R&D., available only under permission from the contractor)
2.	Koller, Martin; Bona, Rodolfo; Braunegg, Gerhart; Hermann, Carmen; Horvat, P.; Kroutil, Markus; Martinz, Julia; Neto, Jose; Pereira, Luis; Varila, Paula: Production of Polyhydroxyalkanoates from Agricultural Waste and Surplus Materials. Biomacromolecules 2005. (in press) ISSN: 1525-7797.
3.	M. Ivančić, B. Šantek, S. Novak, P. Horvat and V. Marić: Bioprocess kinetics in a horizontal rotating tubular bioreactor. Bioprocess Biosyst. Eng. 26; 169 - 175; 2004.
4.	B. Šantek, P. Horvat, S. Novak, V. Marić: Kriteriji povećanja obujma bioreaktora, Kem. Ind., 53 (1); 7 - 24; 2004.
5.	B. Šantek, P. Horvat, S. Novak, D. Sunko, A. Moser and V. Marić: Estimation of axial dispersion in horizontal rotating tubular bioreactor by means of a structured model. Bioprocess Eng. 23; 265 - 274; 2000.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Mayr, B.; Nagy, E.; Horvat, P.; Moser, A.: Scale-up on basis of structured mixing models: a new concept. Inst. Biotechnol., Graz, Austria. Biotechnology and Bioengineering (1994), 43(3), 195-206.
2.	Moser, A.; Mayr, B.; Jury, W.; Steiner, W.; Horvat, P.: Mathematical models for mixing in deep-jet bioreactors: calculation of parameters. Bioprocess Engineering (1991), 7(4), 177-82.
3.	.Moser, A.; Mayr, B.; Jury, W.; Steiner, W.; Horvat P: Mathematical models for mixing in deep jet bioreactors: analysis.. Inst. Biotechnol., Tech. Univ. Graz, Graz, Austria. Bioprocess Engineering , 7(4), 171-176, 1991
4.	Horvat, Predrag: Membrane filtration-integrated bioreactors in wastewater treatment a way out from the dead-end street. Current Studies of Biotechnology, 2 97-115, 2001
5.	Mayr, B.; Horvat, P.; Nagy, E.; Moser, A.: Mixing-models applied to industrial batch bioreactors, Bioprocess Engineering, 9(1), 1-12, 1993
6.	Mayr, B.; Nagy, E.; Horvat, P.; Moser, A.: Modeling of mixing and simulation of its effect on glutamic acid fermentation. Chemical and Biochemical Engineering Quarterly (1993), 7(1), 31-42.
7.	B. Šantek, P. Horvat, S. Novak, A. Moser and V. Marić: Studies on mixing in horizontal rotating tubular bioreactor: III. Influence of liquid level and distance between the partition walls on prediction systems for adjustable model parameters., Bioprocess Eng.; 19 ; 91 - 102; 1998
8.	B. Šantek, P. Horvat, S. Novak, A. Moser and V. Marić, Studies on mixing in horizontal rotating tubular bioreactor: II. Prediction systems for adjustable parameters of "spiral flow" model., Bioprocess Eng.; 19 ; 19 - 28; 1998.
9.	B. Šantek, P. Horvat, S. Novak, A. Moser and V. Marić, Studies on mixing in horizontal rotating tubular bioreactor: I. Optimisation of adjustable model parameters for "spiral flow" model., Bioprocess Eng.; 18 ; 467 - 473; 1998.
10.	B. Šantek, P. Horvat, S. Novak, B. Mayr, A. Moser and V. Marić, Mathematical model of mixing in a horizontal rotating tubular bioreactor : "Spiral flow" model. Bioprocess Eng. ; 14 ; 223 - 229; 1996.
11.	B. Šantek, P. Horvat, S. Novak, B. Mayr, A. Moser and V. Marić, Mathematical model of mixing in a horizontal rotating tubular bioreactor : "Simple flow" model. Bioprocess Eng. ; 14 ; 195 - 204; 1996.

Curriculum course (subject) instructor:

Associate Professor	Božidar	Šantek
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Lectures (2 units)

E-mail address: bsantek@pbf.hr

Address of personal web page:

Date of last review: December 1st 2003.

CV (no more than 1200 characters):

Born in Ludbreg (Croatia) on May 27th, 1966. He finished primary school in Ludbreg and secondary school for chemical technician in Varaždin (1985). After army service (1986) he started the study on the Faculty of Food Technology and Biotechnology, University of Zagreb and he graduated in 1990. In 1991 he started to work as a research assistant at the Faculty of Food Technology and Biotechnology. He defended his M. Sc. Thesis in 1994 and PhD Thesis in 1996. In 1998 he was appointed for Assistant Professor at the Faculty of Food Technology and Biotechnology, University of Zagreb. From February 1st 2001 until February 1st 2002 and June 1st 2002 until December 1st 2002 he was guest researcher at University Bielefeld (Germany). On December 1st 2003 he was appointed for Associate Professor in the Department of Biochemical Engineering of the Faculty of Food Technology and Biotechnology, University of Zagreb. Until now, results of his scientific work were presented in 14 papers and at 22 posters. He was invited speaker on three scientific conferences. He speaks English and German.

List of relevant titles published within the last five years:

No.	Title
1.	B. Šantek, P. Horvat, S. Novak, D. Sunko, A. Moser and V. Marić, Estimation of axial dispersion in horizontal rotating tubular bioreactor by means of a structured model. Bioprocess Eng. 23; 265 - 274; 2000.
2.	M. Ivančić, B. Šantek, S. Novak, and V. Marić, Fermentative bioconversion in a horizontal rotating tubular bioreactor. Proc. Biochem. 39 (8); 995 - 1000; 2004.
3.	M. Ivančić, B. Šantek, S. Novak, P. Horvat and V. Marić, Bioprocess kinetics in a horizontal rotating tubular bioreactor. Bioprocess Biosyst. Eng. 26; 169 - 175; 2004.
4.	A. Slavica, B. Šantek, S. Novak and V. Marić, Microbial acetate oxidation in horizontal rotating tubular bioreactor. J. Biosci. 29; 169 - 177; 2004
5.	B. Šantek, P. Horvat, S. Novak, V. Marić, Kriteriji povećanja obujma bioreaktora, Kem. Ind., 53 (1); 7 - 24; 2004.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	T. Rezić, Dinamika procesa simultane mikrobne nitrifikacije i denitrifikacije u horizontalnom rotirajućem cijevnom bioreaktoru, magistraski rad, siječanj 2005, PBF, voditelj: dr. sc. B. Šantek, izv. prof.
2.	M. Felski, E. Flaschel, K. Friehs, B. Šantek, M. Lotz, Fermentation von *Euglena gracilis* in konditioniertem Kartoffelfruchtwasser (KFW) mit dem Ziel der Paramylon - Produktion, Chemie Ingenieur Technik, 74 (5), 2002, 600 - 601.
3.	B. Šantek, P. Horvat, S. Novak, A. Moser and V. Marić, Studies on mixing in horizontal rotating tubular bioreactor: II. Prediction systems for adjustable parameters of "spiral flow" model., Bioprocess Eng.; 19 ; 19 - 28; 1998.
4.	B. Šantek, P. Horvat, S. Novak, B. Mayr, A. Moser and V. Marić, Mathematical model of mixing in a horizontal rotating tubular bioreactor : "Spiral flow" model. Bioprocess Eng. ; 14 ; 223 - 229; 1996.
5.	B. Šantek and V. Marić, Temperature and dissolved oxygen concentration as parameters of *Azotobacter chroococcum* cultivation for use in biofertilizers, Biotechnol. Letters 17 (4); 453 - 458; 1995.

I. BASIC DATA ON PROPOSED MODULE

Name of module: **BIOPROCESS DESIGN**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): **2/III**

Module status: Ground, ElectiveA, Elective B **Ground**

Language: english

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full Professor	Vladimir	Marić
Scientific-educational title	name	surname

Number of ECTS points 4

Total number of contact hours: 52

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	16
	Auditory Practice	
	Laboratory Practice	
	Practicum	
	Seminar	36
	Field Work	

Requirements for signature to be appended

Finished lectures and seminar

Manner in which examination is taken: Written [ ] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

In this module students will learn basic of bioprocess design through lectures and seminar. During lecture students will acquire knowledge of tehnological, economical, ecological and sociological approach of bioprocess design, definition of project task, content of idealistic and executable technological project task and types of their solution (technological shema of bioprocess and its description, mass and energy balance of bioprocess, selection and estimation of equipment, required man power, internal transport, layout of main equipments in plant building and effect of facility on environment - ecological study). During seminar students will acquire knowledge of the practical elaboration of idealistic technological project of brewery, plant for production of ethanol and tetracycline antibiotics, facility for animal and plant cells application and wastewater treatment. On the basis of acquired theoretical and practical knowledge students will elaborate individual idealistic technological project task of different bioprocesses (etc. production of microbial biomass (yeast or bacteria), production of lactic, acetic or citric acid, production of microbial lipids and wastewater treatment).

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Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Students will acquire knowledge of the elaboration of technological project of different bioprocesses.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	Fiolić V. (1975) Organizacija i vođenje industrijskog projekta Kem. ind., 14, (10), 553-558..

2.	Kraljević J. (1999) Projekt tehnološkog procesa, Poslovna analiza i upravljanje
3.	Vavra I. i Petrov Lj. Osnovi projektiranja, TF, Novi Sad, 1975.
4.	Lundell R. and Laiho P. (1976) Engineering of Fermentation Plants, Part 1. Design Aspects, Process Biochemistry 11 (3), 13.
5.	Strojarski priručnik – IPIM, Zagreb, 1995.

Recommended literature

No.	Title
1.	H. Petersen, Pivara i njena oprema, Jug. udruženje pivara Beograd, 1996.
2.	Zakon o gradnji, N.N. 26. svibanj, 1999; br. 52 str. 1804 – 1822.
3.	Biotechnology, Multivolume Comprehensive Tretease, (H.J. Rehm G. Reed, A. Püchler, P.Stadler, eds.), Vol. 6, (vol.ed. M. Roehr), Vol. 7, (vol.ed. H. Kleinkauf and H. von Doehren), Vol. 11a. (vol.ed. J. Winter) Weinheim, New York, Basel, Cambridge, VCH, 1993
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Full Professor	Vladimir	Marić
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:	Lectures (7 units)
E-mail address:	vmaric@pbf.hr
Address of personal web page:	
Date of last review:	Januar 16th 1996.
CV (no more than 1200 characters):	He was born on January 11th, 1939. Educated in Daruvar and Zagreb. On Biotechnology Department, Faculty of Technology, Zagreb he made his diploma work, master and doctoral theses. Specialisation at the Institute of microbiology, ETH Zuerich (2 times 6 months in 1974. and 1978.) and at the English High Brewing School in Birmingham (10 months 1974/1975). He worked in Daruvar Brewery (1964-1966), Department of Biotehnology, Faculty of Technology (assistant, 1966-1973; assistant professor, 1973-1976; associate professor; 1976- 1979.) and Department of biochemical engineering, Faculty of Food Technology and Biotechnology, Zagreb (full professor, 1980.; head of Department of biochemical engineering, 1980-1984 and 2004-; dean 1984-1988., full professor with tenure, since 1996 -). He is a guest lecturer on the Faculty of Food Technology in Osijek, Faculty of Chemical Technology in Split, Biotechnical Faculty in Ljubljana and High School in Karlovac. He was a president of Council for biotechnical sciences, a member of Croatian National Council for Science (1994-1998), and a member of Management of Karlovac Brewery (1993-2002.). He is a member of Croatian Academy of Technical Science, Deputy Editor of scientific journal Food Technology and Biotechnology and Editor in Chief of professional journal Svijet piva. As author and co-author he published more than 70 scientific and 38 professional papers and 14 elaborates and technological projects. Speaks, writes and reads English, and can use Russian and German languages.

List of relevant titles published within the last five years:

No.	Title
1.	Bauman, M., Mesarić, M., Ribar, S., Marić, V. (2001) Natural zeolite clinoptilolite increases concentrations of sphingoid bases in the yeast *Yarrowia lipolytica*. J. Basic Microbiology, 41, 1, 7-16
2.	Bauman, M., Mesarić, M., Ribar, S., Marić, V. (2002) Dependence of the sphingoid bases concentration on growth phase and temperature in the yeast *Yarrowia lipolytica*. Journal of Basic Microbiology. 42, 1, 3-12
3.	Beluhan, S.. Karmelić, I., Novak, S., Marić, V. (2003) Partial purification and biochemical characterization of alkaline 5'-phosphodiesterase from barley malt sprouts. Biotechnology Letters 25, 13; 1099-1103.
4.	M. Ivančić, B. Šantek, S. Novak, and V. Marić, Fermentative bioconversion in a horizontal rotating tubular bioreactor. Proc. Biochem. 39 (8); 995 - 1000; 2004.
5.	A. Slavica, B. Šantek, S. Novak and V. Marić, Microbial acetate oxidation in horizontal rotating tubular bioreactor. J. Biosci. 29; 169 - 177; 2004

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	K. Štefančić i V. Marić, Pivarski priručnik, Zagreb, 1989.
2.	V. Marić i Z. Nadvornik, Pivo-tekuća hrana, Zagreb, 1995.
3.	Marić, V. Brestovec, J. i Vrbetić, J. Izvedbeni strojno-tehnološki projekt CIP-a za Karlovačku pivovaru, PTI, Zagreb, 1992.
4.	Marić, V., Duić, Z., Nanaši L. I Krčevski D., Strojno tehnološki projekt vrionog podruma Karlovačke pivovare, PTI, Zagreb, 1995.
5.	Marić V. I Grba S.. Idejni projekt tvornice alkoholnih pića za Špiritanu PIK-a Županja, 1998.

Curriculum course (subject) instructor:

Associate Professor	Božidar	Šantek
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Lectures (1 unit), seminar: technological project of brewery

E-mail address: bsantek@pbf.hr

Address of personal web page:

Date of last review: December 1st 2003.

CV (no more than 1200 characters):

Born in Ludbreg (Croatia) on May 27th, 1966. He finished primary school in Ludbreg and secondary school for chemical technician in Varaždin (1985). After army service (1986) he started the study on the Faculty of Food Technology and Biotechnology, University of Zagreb and he graduated in 1990. In 1991 he started to work as a research assistant at the Faculty of Food Technology and Biotechnology. He defended his M. Sc. Thesis in 1994 and PhD Thesis in 1996. In 1998 he was appointed for Assistant Professor at the Faculty of Food Technology and Biotechnology, University of Zagreb. From February 1st 2001 until February 1st 2002 and June 1st 2002 until December 1st 2002 he was guest researcher at University Bielefeld (Germany). On December 1st 2003 he was appointed for Associate Professor in the Department of Biochemical Engineering of the Faculty of Food Technology and Biotechnology, University of Zagreb. Until now, results of his scientific work were presented in 14 papers and at 22 posters. He was invited speaker on three scientific conferences. He speaks English and German.

List of relevant titles published within the last five years:

No.	Title
1.	B. Šantek, P. Horvat, S. Novak, D. Sunko, A. Moser and V. Marić, Estimation of axial dispersion in horizontal rotating tubular bioreactor by means of a structured model. Bioprocess Eng. 23; 265 - 274; 2000.
2.	M. Ivančić, B. Šantek, S. Novak, and V. Marić, Fermentative bioconversion in a horizontal rotating tubular bioreactor. Proc. Biochem. 39 (8); 995 - 1000; 2004.
3.	M. Ivančić, B. Šantek, S. Novak, P. Horvat and V. Marić, Bioprocess kinetics in a horizontal rotating tubular bioreactor. Bioprocess Biosyst. Eng. 26; 169 - 175; 2004.
4.	A. Slavica, B. Šantek, S. Novak and V. Marić, Microbial acetate oxidation in horizontal rotating tubular bioreactor. J. Biosci. 29; 169 - 177; 2004
5.	B. Šantek, P. Horvat, S. Novak, V. Marić, Kriteriji povećanja obujma bioreaktora, Kem. Ind., 53 (1); 7 - 24; 2004.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	B. Šantek, Utjecaj vode na pripremu, učinkovitost i potrošnju sredstava za čišćenje i dezinfekciju, Svijet Piva, 3; 6-12; 1998.
2.	Od 1998. godine urednik sekcija "Povijest pivovarsta, Zanimljivosti o pivu i Pivo kao hobi" časopisa Svijet piva.
3.	M. Felski, E. Flaschel, K. Friehs, B. Šantek, M. Lotz, Fermentation von *Euglena gracilis* in konditioniertem Kartoffelfruchtwasser (KFW) mit dem Ziel der Paramylon - Produktion, Chemie Ingenieur Technik, 74 (5), 2002, 600 - 601.
4.	B. Šantek, P. Horvat, S. Novak, B. Mayr, A. Moser and V. Marić, Mathematical model of mixing in a horizontal rotating tubular bioreactor: "Spiral flow" model. Bioprocess Eng. ; 14 ; 223 - 229; 1996.
5.	B. Šantek and V. Marić, Temperature and dissolved oxygen concentration as parameters of *Azotobacter chroococcum* cultivation for use in biofertilizers, Biotechnol. Letters 17 (4); 453 - 458; 1995.

Curriculum course (subject) instructor:

Assistant Professor	Sunčica	Beluhan
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Seminar: individual student project task of different bioprocesses

E-mail address: sunbel@pbf.hr

Address of personal web page:

Date of last review: February 1st 2005.

CV (no more than 1200 characters): Born on July 9, 1967. Educated in Virovitica and Zagreb. On Faculty of Food Technology and Biotechnology, Department of Biochemical Engineering, University of Zagreb, she made her Diploma work, Master and Doctoral thesis (B.Sc. 1989., M.Sc. 1994., PhD. 2001). Position title is the Assistant Professor. Research and professional experience (1990 - 1994. Research Associate, 1994 – 2001. Teaching Assistant, 2001 – 2005. Teaching Associate, 2005 - Assistant Professor). As author and co-author, she published 5 scientific and 4 professional papers. She is the holder of one current occupant technological project. Speaks, writes and reads English language.

List of relevant titles published within the last five years:

No.	Title
1.	D. Beluhan, S. Beluhan, Hybrid Modelling Approach to On-line Estimation of Yeast Biomass Concentration in Industrial Bioreactor. *Biotechnology Letters*, 22 (8) (2000), 631-635.
2.	S. Beluhan, I. Karmelić, S. Novak, V. Marić, Partial Purification and Biochemical Characterization of Alkaline 5'-Phosphodiesterase from Barley Malt Sprouts, *Biotechnology Letters*, 25 (13) (2003). 1099-1103.
3.	S. Beluhan, V. Marić, *Umami* taste: from surplus brewer's yeast to 5'-ribonucleotides, Current Studies of Biotechnology, Vol. III - Food, Zagreb, 2003.
4.	S. Beluhan, Nova valorizacija sladnih klica, nusproizvoda sladara, Svijet piva. 6 (2001.), 35; 10-13.
5.	S. Beluhan, Okusne supstancije iz pivskog kvasca, Svijet piva 7 (2001), 37, 9-13.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	
2.	
3.	
4.	
5.	

Curriculum course (subject) instructor:

Tenure full professor	**Srećko**	**Matošić**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work; subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Seminar: technological project design of tetracycline antibiotics production

E-mail address: smatos@pbf.hr

Address of personal web page:

Date of last review: October 5th , 1999

CV (no more than 1200 characters): Prof. Srećko Matošić was born in Split, on January 23rd, 1939. He was graduated on 1962 at the Faculty of Technology, University of Zagreb. In 1963 he started to work as assistant on the subject "Chemistry and technology of antibiotics" at the Department of Biotechnology, Faculty of Technology, University of Zagreb. He won master's degree on 1971. 197l-1973 he was guest researcher at Istituto Superiore di Sanita, Rome, Italy and he worked on biosynthesis and isolation of ergot alkaloids. He won Ph.D. on 1976. On 1977 he was appointed for Assistant Professor on the Department of Biotechnology, Faculty of Technology. He became Associate Professor on 1989, Full professor on 1996 and Tenure Full Professor on 1999. Prof. Srećko Matošić was a supervisor of postgraduate study "Biotechnology – Bioprocess Engineering" at the Faculty of Food Technology and Biotechnology. 1978/79 he was Head of the Institute of Food and Biochemical Engineering and Department of Food Technology and Biotechnology on the Faculty of Technology, University of Zagreb. He was Head of Department of Biochemical Engineering from 1987 to 1990, and from 1994 to 1996. He is a Vice-Dean for Finances on the Faculty of Food Technology and Biotechnology since 2003, and he was Vice-Dean before, from 1996 to 1999. He speaks English, Italian and Russian.

List of relevant titles published within the last five years:

No.	Title
1.	B. Kos, J. Šušković, S. Vuković, M. Šimpraga, J. Frece, S. Matošić, Adhesion and Aggregation Ability of Probiotic Strain *Lactobacillus acidophilus* M92, *J. Appl. Microbiol. 94* (2003) 981
2.	J. Šušković, B. Kos, J. Frece, S. Beluhan, S. Matošić, Sinbiotièka svojstva *Lactobacillus acidophilus* M92, *Mljekarstvo, 53* (2) (2003) 83
3.	J. Šušković, B. Kos, J. Goreta, S. Matošić, Role of lactic acid bacteria and bifidobacteria in synbiotic effect, *Food Technol. Biotechnol. 39* (2001) 227
4.	B. Kos, J. Šušković, J. Goreta, S. Matošić, Effect of Protectors on the Viability of *Lactobacillus acidophilus* M92 in Simulated Gastrointestinal Conditions, *Food Technol. Biotechnol. 38* (2) (2000) 121
5.	J. Šušković, B. Kos, S. Matošić, V. Besendorfer, The effect of bile salts on survival and morphology of a potential probiotic strain *Lactobacillus acidophilus* M92, *World J. Microbiol. Biotechnol. 16* (7) (2000) 673

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	S. Matošić, J. Šušković: Biotechnological production of Drugs and Specific Chemicals (antibiotics, alkaloids), Internal script, Faculty of Food Technology and Biotechnology, 1999.
2.	M. Bošnjak, V. Delić, S. Grba, P. Horvat, V. Johanides, V. Marić, Z. Matijašević, S. Matošić, S. Novak, I. Pavušek, D. Vlašić: Biochemical Engineering, Internal script, Faculty of Food Technology and Biotechnology, Zagreb(1987, 1990).
3.	D. Hranueli, N.Perić, H. Petković, G. Biuković, Z. Toman, J. Pigac, B. Borovička, A. Bago, I. Crnolatac, T. Maršić, L. Zhou, S. Matošić, P. G. Waterman, J. Cullum, I. S. Hunter, Novel Hybrid Polyketide Compounds Produced by Genetic Engineering of the Oxytetracycline Biosynthetic Pathway. *Food Technol. Biotechnol.* *37* (1999) 117-125.
4.	S. Matošić, M. Mehak, L. Ercegović, N. Brajković, J. Šušković, Effect of surfactants on the production of ergot alkaloids by immobilized mycelia of *Claviceps paspali*.*World. J. Microbiol. Biotechnol.* *14* (1998) 447-450.
5.	V. Johanides, S. Divjak, Z. Duvnjak, S. Grba, A. Korčulanin, V. Marić, S. Matošić, Industrial microbiology, Internal script, Faculty of Food Technology and Biotechnology, Zagreb 1984.

Curriculum course (subject) instructor:

Tenure full professor	**Zlatko**	**Kniewald**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of biochemical engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [x] Append X in the appropriate box

Title of curriculum module executed: Seminar: technological project design for use of animal and plant cells

E-mail address: zlatko.kniewald@pbf.hr

Address of personal web page: http://www.pbf.hr/knic

Date of last review: October 26th , 1999

CV (no more than 1200 characters):

Born in Zagreb, Croatia, June 2, 1938. Croatian national. **Educ:** F.of Technol. – Dpt. of Biotechnology, U. of Zagreb, 1961; F. of Pharm. & Biochem. Zagreb, M. Sc. Phys. Chem, 1966; F. of Technol., U. of Zagreb, Ph. D. Biotech. Sci., 1970; Postgrad. study Inst. of Pharmacol., Milan, Italy, 1968-70; U. of Manchester, England, 1991, Semin. "Manag. res. in higher educ."; U. of Southampton, England, 1995, Semin. "Ind. and higher educ.: Working together". **Empl:**. "Žumberak" Fact., Savski Marof, 1961-65; Lab. for Exp. Med., Zagreb, 1965-75; Rep. Counc. for Scient. Work of the Soc. Rep. of Croatia, Zagreb, 1972-74; Rep. Comm. for Scient. Work of the Soc. Rep. of Croatia, Secretary-General, 1975-80; Fac. of Food Technol. and Biotechnol., 1980. **Elected (E.)** Assist. in the Lab. for Exp. Med, Zagreb, 1965; "Ruđer Bošković" Institute, E. Sen. Sci. Assoc., 1977; Facult. of Food Technol. and Biotechnol., E. Sci. Counsel., 1980; E. Full Prof. 1987, eval. for Full Prof. 1993, E. Tenure Full Prof., 1995. **ISI citation** > 600, CC sc. papers > 40, other pap. > 95, 1 reg. patent, 1 reg. industr. designs. **Memb.:** Croat. Soc. of Biotech., Soc. Study of Reprod., USA, Sci. Counc. for Agricult. and For. of the Croat. Acad. of Sci. and Arts, Croat. Acad. of Eng., Full Memb. and Presid. (2003-05, 2005- 2nd mand.); The World Innov. Found., England, Hon. Mem., 2004, Croat. Eng. Assoc., Zagreb, Mem. of the Gov. Board, Biotech. Found. of the Fac. of Food Tech.. and Biotechn.., Zagreb, Manager. **Awards:** The "Ruđer Bošković" Ann. Award. for Sci. Work grant. by the Parliam. of the Soc. Rep. of Croatia, 1986, Med. of Lab. with Gold. Wreath, 1986; Fac. of Food Tech. and Biotech. Ann. Aw., 2001/02.

List of relevant titles published within the last five years:

No.	Title
1.	Z. Kniewald, V.Gaurina-Srček (2000): The effect of new growth promoter CABRPP on biomass production of BHK21 C13 cells. Current Studies of Biotechnology vol. I. Biomedicine (ured. Z. Kniewald) izd. Hrvatsko društvo za biotehnologiju, Zagreb, 61-68,
2.	J.Kniewald, M.Jakominić, A.Tomljenović, B.Šimić, P.Romac, Đ.Vranešić, Z.Kniewald (2000): Disordars of Male Rat Reproductive Tract under the Influence of Atrazine. Journal of Applied Toxicology 20**,** 61-68.
3.	A. Tomljenović, V. Zechner-Krpan, Z. Kniewald (2000): Hypothalamo-pituitary-ovarian axis in rats under the influence of gonadoliberin or atrazine. Current Studies of Biotechnology vol.I. Biomedicine (ured. Z. Kniewald) izd. Hrvatsko društvo za biotehnologiju, Zagreb, 69-74.
4.	A. Jeličić, V. Gaurina-Srček, D. Polančec, D. Sladić, Z. Kniewald (2001): Induction and detection of apoptosis in BHK21 C13 cells. Current Studies of Biotechnology vol.II. Environment (ured. Z.Kniewald) izd. Hrvatsko društvo za biotehnologiju, Zagreb.
5.	V. Gaurina Srček, S. Čajavec, D. Sladić, Z. Kniewald: BHK 21 C13 cells for Aujeszky's disease virus production using the multiple harvest process. Cytotechnology (accepted for publication in 2004.)

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Z.Kniewald, P.Mildner (1962) Nikotinamid adenozin dinukleotid (NAD) u pekarskom kvascu (Saccharomyces cerevisiae). Kemija u Industriji 4, 171-174.
2.	R.Massa, E.Stupnicka, Z.Kniewald, L.Martini (1972) The transformation of testosterone into dihydrotestosterone by the brain and the anterior pituitary. Journal of Steroid Biochemistry 3, 385-399
3.	Z.Kniewald, Z.Pučar (1976) Electrophoretic mobilities of ^{22}Na ^{90}Sr and ^{36}Cl ions in concentrated aqueous solutions of some inorganic 1:1, 2:1 and 2:2 salts and in see water. Journal of the Chemical Society, Faraday Transactions 1, 72 987-995.
4.	Z.Kniewald, J.Kniewald (1981) Mode of androgen action at male and female calf pituitary level. Journal of steroid Biochemistry 15 433-437.
5.	Z.Kniewald, S.Čajavec, V.Zechner-Krpan, I.Gmajnički, Lj.Markuš-Cizelj (1995) Upotreba animalnih stanica u proizvodnji cjepiva. Zbornik radova znanstveno-stručnog sastanka "Vakcinologija danas i sutra" (ured. D. Hajsig), izd. Hrvatsko mikrobiološko društvo, Zagreb, str. 67-75.
6.	More than 40 graduation thesis, 12 master's degrees and 3 doctorates; University textbook (1993.) and university manual (2000.)

Curriculum course (subject) instructor:

Full professor	**Slobodan**	**Grba**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Food Technology and Engeenering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Seminar: technological project design of ethanol production

E-mail address: sgrba@pbf.hr

Address of personal web page:

Date of last review: 12 .01. 1999. Full professor

CV (no more than 1200 characters):

Dr.sc. Slobodan Grba was born in Narta, on 16. 04. 1942.,R.Croatia. Elementary and High School he attended in Croatia and was graduated at High School in Zagreb 1960. Study of Biotechnology on Faculty of Technology enrolled at the same year and ended the study in 1966. Post graduated study he finished 1973. at the University of Zagreb and become Ms. degree in biotechnology. After that he performed the Ph.D. Thesis in 1976. on the Faculty of Food Technology and Biotechnology, University of Zagreb. Professional work he started in PLIVA factory, in the production of antibiotics. After that (1969) he was elected as assistant in Department of Biotechnology for the subject of Fermentation technology at Faculty of Technology in Zagreb. Assistant professor at the same faculty become in 1979. As associated professor was elected in 1989 at the Faculty of Food Technology and Biotechnology in Zagreb. Full professor become in 1991.on the same faculty.

Today he is head of Laboratory of Fermentation Technology and Yeast at the Faculty of Food Technology and Biotechnology. During his professional training he attended ALKO Institute (Finland) for 18 months, twice 1971/72. 1974. and in USA for three weeks. His professional works resulted in the cooperation with industry almost all the time. He published 35 scientific papers and about 20 professional papers, technological studies, 1 patent, mainly in the field of fermentation technology and biochemical engineering.

List of relevant titles published within the last five years:

No.	Title
1.	Gulan Zetić, V., Stehlik-Tomas, V., Grba, S., Lutilsky, L., Kozlek, D.: Chromium Uptake by *Saccharomyces cerevisiae* and Isolation of Glucose Tolerance Factor from Yeast Biomass. (2001) *J. Biosci.* 26 (2) 217-223.
2.	Grba, S; Stehlik-Tomas, V; Stanzer, D; Vahčić, N; Škrlin, A: Selection of Yeast Strain *Kluyveromyces marxianus* for Alcohol and Biomass Production on Whey (2002) Chem. Bio. Eng. Q. 16 (1) 13-16.
3.	Stehlik-Tomas, V; Grba, S; Stanzer, D; Vahčić, Gulan-Zetić, V; Uptake of Iron by Yeast Cells and its Impact on Biomass Production (2003). Acta Alimentaria 32 (3) 279-287.
4.	Stehlik-Tomas, V; Gulan Zetić, V; Stanzer, D; Grba, S: Zinc, Copper and Manganese Enrichment in Yeast *Saccharomyces cerevisiae* (2004) Food Technology and Biotechnology, 42 (2) 115-120.
5.	Stanzer, D; Grba, S; Stehlik-Tomas, V; Gulan Zetić, V; Mrvčić,J. The Influence of molasses addition in whey on the kinetic of alcoholic fermentation by yeast *Kluyveromyces marxianus* (2004) Mljekarstvo 54 (1) 27-38.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Grba, S., Oura, E. Suomalainen, H., (1979) Formation of Trehalose and Glycogen in Growing Baker's Yeast, Finn.Chem.Lett. (2) 61.
2.	Strel, B., Grba, S., Marić. V., (1993) Enhancement of Biomass and Fermentation Activity of Surplus Brewers Yeast in a Fed-batch Process.
3.	Čović, Ž., Grba, S., Stehlik-Tomas, V. (1992) Optimisation of bakers Yeast Production, Preh.Biotehnol.Rev. 30(2-3)117.
4.	Grba, S., Bezmalinović, I., (1994).Technological procedures for the Production of Brewers Yeast *Saccharomyces uvarum* for bakery , Patent HR P-920067 B_1.
5.	Grba, S., and co. (2004) Technology project of Ministry of science, «Production of Alcohol and Food Yeast on Different Substrates TP-01/0058-07.

Curriculum course (subject) instructor:

Full Professor	Margareta	Glancer-Šoljan
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Food Technology Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Seminar: technological project design of plant for wastewater treatment

E-mail address: mglancer@pbf.hr

Address of personal web page:

Date of last review: January 12th 1999.

CV (no more than 1200 characters):

Margareta Glancer-Šoljan, born in Teslić (Bosnia and Herzegovina) in 1944 where she graduated from the primary school and secondary technical school (chemistry). Took BSc from the Faculty of Technology in Tuzla (1971). Post-graduate studies in chemical engineering began at the Faculty of Technology in Zagreb (1973) where she took her MSc and PhD in process engineering (1976 and 1977 respectively). Years 1978 and 1979 spent at the Massacussets Institute of Technology (MIT) Cambridge, USA. From 1971 worked as technical associate at Department of Biotechnology, Faculty of Technology in Zagreb. In 1973 elected at the same Faculty for an assistant professor and in 1979 for a associated professor. In 1986 became a professor at the Faculty of Food Technology and Biotechnology, University of Zagreb (graduate and post-graduate studies in the treatment of wastewater and waste materials). Mentored over 80 MSc and 8 PhD theses. Leader of five national and two international scientific projects. Awarded «Nikola Tesla» and «Kliment Ohridski» awards (1988, IFIA 1995 and ARCA 2003). Published over 60 scientific works.

List of relevant titles published within the last five years:

No.	Title
1.	Landeka Dragičević, T., Zanoški, M., Glancer-Šoljan, M., Šoljan, V., Matić, V., Krajina , J. (2004) Activity of the granulated biomass of the mixed microbial culture for highly efficient carbon and nitrogen removal in the process wastewater. Proceedings of the European Symposium on Environmental Biotechnology, ESEB 2004, (Ed. W. Verstraete), 25-28 April 2004, Oostende, Belgium, 645-648.
2.	Čačić, lj., Šoljan, V., Dragičević, T.L., Glancer-Šoljan, M., Vuksan, B., Krivohlavek, A. (2002) The removal of nitrogen substances from a chemically defined medium by the addition of liner alkylbenzene sulfonate (LAS) using a mixed bacterial culture of nitrificants and denitrificants. Limnological reports. Proceedings of the 34th Conference in Tulcea, August 2002 (Eds. G. Brezeanu, R. Stiuca), Tulcea, Romania, Vol. **34**, 21-30.
3.	Glancer-Šoljan, M., Ban, S., Landeka Dragičević, T., Šoljan, V., Matić, V. (2001) Granulated mixed microbial culture suggesting successful employment of bioaugmentation in the treatment of process wastewater. *Chem.Biochem.Eng.Q.* **15** (3) 87-94.
4.	Glancer-Šoljan, M., Šoljan, V., Landeka Dragičević, T., Čačić. Lj. (2001) Aerobic degradation of formaldehyde in wastewater from the production of melamine resins. *Food technol. biotechnol.* **39** (3) 197-202.
5.	

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Glancer-Šoljan, M., Landeka Dragičević, T., Šoljan, V., Ban, S. (2002) Biološka obradba otpadnih voda. Course material. Ed. Kugler, Zagreb.
2.	Glancer-Šoljan, M. (1993) New technologies for biological treatment of municipal and industrial waste waters by using suitable microorganisms as starter culture. *Kem. Ind*. **42** (9), 323-330.
3.	Landeka, T., Šoljan, V., Glancer, M. (1993) Razgradnja tiocijanata odabranim sojevima bakterija i združenim mješovitim kulturama. *Prehrambeno-tehnol. botehnol. rev.* **31** (4)137-143.
4.	Dvoraček, L., Glancer, M., Ban, S. (1989) Degradation of phenol in industrial waste waters. Part I: Selection of microorganisms. *Prehrambeno-tehnološka i biotehološka revija* **27** (2-3) 147-154.
5.	Glancer-Šoljan, M., Ban, S.N., Dvoraček,L. (1985) Biodegradacija betaina pomoću kvasca *Trichosporon* i mješovite kulture aktivnog mulja. *Prehrambeno-tehnološka revija,* **7** (1-2), 3-10.

I. BASIC DATA ON PROPOSED MODULE

Name of module: **MANAGEMENT**

Core course of studies for module: **Graduate study:**

BIOPROCESS ENGINEERING
BIOTECHNOLOGY
NUTRITION
FOOD ENGENEERING
FOOD SAFETY MANAGEMENT

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): II. / 4 (i.e. V. / 10)

Module status: Ground, Elective A, Elective B: Ground

Language: Croatian

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Professor	Ivan	Vajić
Scientific-educational title	name	surname

Number of ECTS points: 5

Total number of contact hours: 60

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	30
	Auditory Practice	12
	Laboratory Practice	
	Practicum	
	Seminar	18
	Field Work	

Requirements for signature to be appended

The concept of seminar courses and exercises are aimed to assure students' understanding and systematic realization of their seminar works (business plans). Student's seminar work that articulates certain business idea is the requirement, which has to be fulfilled before taking the exam.

Manner in which examination is taken: Written [X] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Learning of managerial concepts and skills, as following: management in global environment, social and ethical responsibility of manager, managerial decision-making, planning, strategic planning, organization, organization building, controlling, work groups management, executive staff in organization, communication and negotiation, human resources management, enterprise management, development and innovations, production and operational management, planning and control in production and stocks, management of decision-making information, entrepreneurship, career in management

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

To start with apprehension of managerial knowledge and skills. Enable to comprehend modern theoretic basis of managerial practices. Development of abilities relevant for managerial skills. Understanding of managerial theories and techniques. Understanding of competitive and contractual managerial theories and practices, as well as the importance of theory to practice. Development of communication skills – in conversation and in managerial reports. Development of understanding of internal relations, especially within enterprises, as well as within business network.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	**S. Robbins, D. DeCenzo (2004)**, *Fundamentals of Management: Essential Concepts and Applications*, 5th Edition, Prentice Hall
2.	
3.	
4.	
5.	

Recommended literature

No.	Title
1.	**J.H. Donnelly, Jr., J.L. Gibson, J.M. Ivancevich (1997)**, *Fundamentals of Management*, 10th Edition, BPI/Irwin, Inc.
2.	
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Professor	Ivan	Vajić
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Faculty of Food Technology and Biotechnology, General Programmes Department

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: Management

E-mail address: ivajic@pbf.hr

Address of personal web page:

Date of last review: June 12th, 2000

CV (no more than 1200 characters):

Date and city of birth: July 22nd, 1941, Mitlo, Croatia
Education: High industrial-pedagogical School, Rijeka (1965); Faculty of Economics, University of Zagreb, post-graduate scientific study, (1977); Faculty of Economics, University of Zagreb, Doctor's degree (1981);
Elections in education career: Faculty of Economics, University of Zagreb (assistant lecturer, 1982; assistant professor, 1986; professor, 1990; professor in permanent election, 2000.)
Scientific works: 2 books, 5 books as co-author and editor-in-chief, 12 works published in journals quoted in secondary publications, 5 works in collected papers journals, 3 scientific projects, participation at 10 scientific meetings (7 of them international)
Work experience: Technical School, Zadar, professor of technical and technology group of subjects (1966.-1973.); PPK Koka Varaždin, director of filial in Zadar (1973.-1977.); Food Technology Institute, University of Zagreb, head of Investment Consulting Depth. (1977.-1982.); Faculty of Food Technology and Biotechnology, university professor (1982.-)

List of relevant titles published within the last five years:

No.	Title
1.	**Vajić, I. et al**., chief editor Vajić, I. (**2004**.) 'Entrepreneurial Management', Institute for Small and Medium Enterprises, Beograd & Centre for Investments, Zagreb; scientific book, 484 pgs
2.	**Vajić, I**. (**2004.**), Public-Private Partnerships Model for Realization of Tourist Project Pašman Resort, Municipality of Pašman, scientific paper, 98 pgs
3.	**Vajić, I**. (**2002**.), 'Due Diligence of Public City and Suburban Transport Split', publisher: City of Split, expert elaboration, 40 pgs
4.	
5.	

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	**Vajić, I. et al**., chief editor Vajić, I. (**2004**.) 'Entrepreneurial Management', Institute for Small and Medium Enterprises, Beograd & Canter for Investments, Zagreb; scientific book, 484 pgs
2.	**Vajić, I.** head of scientific project (**1996.-2003.**), 'Management and Entrepreneurship in Countries in Transition', Ministry of Science and Technology, Croatia
3.	**Vajić, I**. head of scientific project (**2004.-)** , 'Public-Private Partnerships in Communal infrastructure', Ministry of Science, Education and Sport, Croatia
4.	**Vajić, I**. **et al**., chief editor Vajić, I (**1997.**), 'Handbook for managers and Entrepreneurs', Centre for Entrepreneurship, Zagreb, 243 pgs
5.	**Vajić, I**. **et al**., chief editor Vajić, I (**1994**.) 'Management and Entrepreneurship', Centre for Entrepreneurship, Zagreb, scientific work, text-book, 844 pgs

Curriculum course (subject) instructor:

Assistant professor	Đurđica	Knapić Salamon
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Faculty of Food Technology and Biotechnology, General Programmes Department

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed:

E-mail address:

Address of personal web page:

Date of last review: 23. 10. 1990.

CV (no more than 1200 characters):

Date and city of birth: May 3rd, 1961, Karlovac, Croatia
Education: 1985-1990 (Faculty of Economics, University of Zagreb, post-graduate study of *Theory and Politics of Placement - Marketing*), 1980-1985. (Faculty of Economics, University of Zagreb, course *Exchange and Market;* during the study awarded with Rector's Award, 1985); 1975-1980. (Secondary School for Economics, Karlovac and 1968-1975 Primary School *Janko Mendiković*, Karlovac).
Work experience: 1990 (Faculty of Food Technology and Biotechnology – assistant professor; 1987-1990 (Faculty of Food Technology and Biotechnology – instructor and research assistant at the scientific field of biotechnology); 1986-1987 (*Velebit – Domestic Trade*, Zagreb – officer for financial operative (part-time job); 1985-1986. (*Zagrebački transport*i, Zagreb – officer for plan and analysis (part-time)

List of relevant titles published within the last five years:

No.	Title
1.	**Salamon, D. & Đ. Knapić Salamon (2002)**, *'Innovative Systems as the Initiators of Regional Development',* in: Scientific symposium 'Development Strategy and Marketing of City and County', Sisak, April 4-5, 2002, Collected Papers, (Zagreb: Coordination of Patriotic War Associations of the Sisačko-moslavačka County and CROMAR, Croatian Unity of Marketing Associations), pp. 27-72.
2.	**Knapić Salamon, Đ. (2004)**, *Development of Competitive Marketing Advantage through Biotechnology Enterprises Networking*, Doctor's dissertation (Zagreb: Faculty of Economics, University of Zagreb)
3.	
4.	
5.	

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	**Salamon, D. & Đ. Knapić Salamon (2002)**, *'Innovative Systems as the Initiators of Regional Development',* in: Scientific symposium 'Development Strategy and Marketing of City and County', Sisak, April 4-5, 2002, Collected Papers, (Zagreb: Coordination of Patriotic War Associations of the Sisačko-moslavačka County and CROMAR, Croatian Unity of Marketing Associations), pp. 27-72.
2.	**Knapić Salamon, Đ. (2004)**, *Development of Competitive Marketing Advantage through Biotechnology Enterprises Networking*, Doctor's dissertation (Zagreb: Faculty of Economics, University of Zagreb)
3.	
4.	
5.	

I. BASIC DATA ON PROPOSED MODULE

Name of module: **BREWING TECHNOLOGY**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [X] or Graduate (Ms) [ ] Append X in the appropriate box

Academic year in which module appears (semester): **3/VI**

Module status: Ground, ElectiveA, Elective B **ElectiveA**

Language: english

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full Professor	Vladimir	Marić
Scientific-educational title	name	surname

Number of ECTS points 4

Total number of contact hours: 48

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	24
	Auditory Practice	
	Laboratory Practice	
	Practicum	15
	Seminar	9
	Field Work	

Requirements for signature to be appended

Finished lectures, practicum and seminar

Manner in which examination is taken: Written [ ] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

In this module during lectures students will acquire knowledge of wort production from malt, unmalted grains and sugar syrups, boiling problems and wort hopping, brewer's yeast propagation, operation procedures for wort fermentation and green beer maturation, new processes in beer filtration and stabilization, high gravity brewing, production of top-fermented beers, production of beers with reduced alcohol content and special types of beer, cleaning and disinfection of equipment and plant, control of process efficiency and beer quality, effect of packing on the beer quality, by-products and waste materials from beer production. In practicum, students will produce wheat beeer in laboratory microbrewery. At the end of lectures students have to write individual seminar from one lecture's item.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Students will acquire knowledge and skills of beer production from different row materials, operation procedures for wort fermentation and green beer maturation, beer filtration and stabilization, cleaning and disinfection of equipment and plant, beer packing and quality control.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	V. Marić, Tehnologija slada i piva, (Interna skripta), Zagreb, 1987
2.	K. Schuster, F. Weinfurtner i L. Narziss, Tehnologija proizvodnje sladovine, PZIPSJ, Beograd, 1988.
3.	K. Štefančić i V. Marić, Pivarski priručnik, Zagreb, 1989.
4.	V. Marić i Z. Nadvornik, Pivo-tekuća hrana, Zagreb, 1995.
5.	

Recommended literature

No.	Title
1.	V. Marić, Biotehnologija i sirovine, SIP, Zagreb, 2000.
2.	W. Kunze, Technology Brewing and Malting (Int. ed.), Westekreuz-Druckerei Ahreis KG, Berlin, 1996.
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Full Professor	Vladimir	Marić
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:	Lectures (9 units)
E-mail address:	vmaric@pbf.hr
Address of personal web page:	
Date of last review:	Januar 16th 1996.
CV (no more than 1200 characters):	Born on January 11th, 1939. Educated in Daruvar and Zagreb. On Biotechnology Department, Faculty of Technology, Zagreb he made his diploma work, master and doctoral theses. Specialisation at the Institute of microbiology, ETH Zuerich (2 times 6 months in 1974. and 1978.) and at the English High Brewing School in Birmingham (10 months 1974/1975). He worked in Daruvar Brewery (1964-1966), Department of Biotehnology, Faculty of Technology (assistant, 1966-1973; assistant professor, 1973-1976; associate professor; 1976- 1979.) and Department of biochemical engineering, Faculty of Food Technology and Biotechnology, Zagreb (full professor, 1980.; head of Department of biochemical engineering, 1980-1984 and 2004-; dean 1984-1988., full professor with tenure, since 1996 -). He is a guest lecturer on the Faculty of Food Technology in Osijek, Faculty of Chemical Technology in Split, Biotechnical Faculty in Ljubljana and High School in Karlovac. He was a president of Council for biotechnical sciences, a member of Croatian National Council for Science (1994-1998), and a member of Management of Karlovac Brewery (1993-2002.). He is a member of Croatian Academy of Technical Science, Deputy Editor of scientific journal Food Technology and Biotechnology and Editor in Chief of professional journal Svijet piva. As author and co-author he published more than 70 scientific and 38 professional papers and 14 elaborates and technological projects. Speaks, writes and reads English, and can use Russian and German languages.

List of relevant titles published within the last five years:

No.	Title
1.	Bauman, M., Mesarić, M., Ribar, S., Marić, V. (2001) Natural zeolite clinoptilolite increases concentrations of sphingoid bases in the yeast *Yarrowia lipolytica*. J. Basic Microbiology, 41, 1, 7-16
2.	Bauman, M., Mesarić, M., Ribar, S., Marić, V. (2002) Dependence of the sphingoid bases concentration on growth phase and temperature in the yeast *Yarrowia lipolytica*. Journal of Basic Microbiology. 42, 1, 3-12
3.	Beluhan, S.. Karmelić, I., Novak, S., Marić, V. (2003) Partial purification and biochemical characterization of alkaline 5'-phosphodiesterase from barley malt sprouts. Biotechnology Letters 25, 13; 1099-1103.
4.	M. Ivančić, B. Šantek, S. Novak, and V. Marić, Fermentative bioconversion in a horizontal rotating tubular bioreactor. Proc. Biochem. 39 (8); 995 - 1000; 2004.
5.	A. Slavica, B. Šantek, S. Novak and V. Marić, Microbial acetate oxidation in horizontal rotating tubular bioreactor. J. Biosci. 29; 169 - 177; 2004

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	V. Marić, Tehnologija slada i piva, (Interna skripta), Zagreb, 1987
2.	K. Štefančić i V. Marić, Pivarski priručnik, Zagreb, 1989.
3.	V. Marić i Z. Nadvornik, Pivo-tekuća hrana, Zagreb, 1995.
4.	V. Marić, Biotehnologija i sirovine, SIP, Zagreb, 2000
5.	Strel, B., Grba, S. i Marić, V.(1993) Enhancement of biomass and fermentation activity of surplus brewer's yeast in fed-batch process. Appl. Microbiol. Biotechnol. **39**, 53 - 57

Curriculum course (subject) instructor:

Associate Professor	Božidar	Šantek
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Lectures (2 units), practicum

E-mail address: bsantek@pbf.hr

Address of personal web page:

Date of last review: December 1st 2003.

CV (no more than 1200 characters):

Born in Ludbreg (Croatia) on May 27th, 1966. He finished primary school in Ludbreg and secondary school for chemical technician in Varaždin (1985). After army service (1986) he started the study on the Faculty of Food Technology and Biotechnology, University of Zagreb and he graduated in 1990. In 1991 he started to work as a research assistant at the Faculty of Food Technology and Biotechnology. He defended his M. Sc. Thesis in 1994 and PhD Thesis in 1996. In 1998 he was appointed for Assistant Professor at the Faculty of Food Technology and Biotechnology, University of Zagreb. From February 1st 2001 until February 1st 2002 and June 1st 2002 until December 1st 2002 he was guest researcher at University Bielefeld (Germany). On December 1st 2003 he was appointed for Associate Professor in the Department of Biochemical Engineering of the Faculty of Food Technology and Biotechnology, University of Zagreb. Until now, results of his scientific work were presented in 14 papers and at 22 posters. He was invited speaker on three scientific conferences. He speaks English and German.

List of relevant titles published within the last five years:

No.	Title
1.	B. Šantek, P. Horvat, S. Novak, D. Sunko, A. Moser and V. Marić, Estimation of axial dispersion in horizontal rotating tubular bioreactor by means of a structured model. Bioprocess Eng. 23; 265 - 274; 2000.
2.	M. Ivančić, B. Šantek, S. Novak, and V. Marić, Fermentative bioconversion in a horizontal rotating tubular bioreactor. Proc. Biochem. 39 (8); 995 - 1000; 2004.
3.	M. Ivančić, B. Šantek, S. Novak, P. Horvat and V. Marić, Bioprocess kinetics in a horizontal rotating tubular bioreactor. Bioprocess Biosyst. Eng. 26; 169 - 175; 2004.
4.	A. Slavica, B. Šantek, S. Novak and V. Marić, Microbial acetate oxidation in horizontal rotating tubular bioreactor. J. Biosci. 29; 169 - 177; 2004
5.	B. Šantek, P. Horvat, S. Novak, V. Marić, Kriteriji povećanja obujma bioreaktora, Kem. Ind., 53 (1); 7 - 24; 2004.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	B. Šantek, Utjecaj vode na pripremu, učinkovitost i potrošnju sredstava za čišćenje i dezinfekciju, Svijet Piva, 3; 6-12; 1998.
2.	Od 1998. godine urednik sekcija "Povijest pivovarsta, Zanimljivosti o pivu i Pivo kao hobi" časopisa Svijet piva.
3.	M. Felski, E. Flaschel, K. Friehs, B. Šantek, M. Lotz, Fermentation von *Euglena gracilis* in konditioniertem Kartoffelfruchtwasser (KFW) mit dem Ziel der Paramylon - Produktion, Chemie Ingenieur Technik, 74 (5), 2002, 600 - 601.
4.	B. Šantek, P. Horvat, S. Novak, B. Mayr, A. Moser and V. Marić, Mathematical model of mixing in a horizontal rotating tubular bioreactor: "Spiral flow" model. Bioprocess Eng. ; 14 ; 223 - 229; 1996.
5.	B. Šantek and V. Marić, Temperature and dissolved oxygen concentration as parameters of *Azotobacter chroococcum* cultivation for use in biofertilizers, Biotechnol. Letters 17 (4); 453 - 458; 1995.

Curriculum course (subject) instructor:

Assistant Professor	Sunčica	Beluhan
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Lectures (1 unit), seminar

E-mail address: sunbel@pbf.hr

Address of personal web page:

Date of last review: February 1st 2005.

CV (no more than 1200 characters): Born on July 9, 1967. Educated in Virovitica and Zagreb. On Faculty of Food Technology and Biotechnology, Department of Biochemical Engineering, University of Zagreb, she made her Diploma work, Master and Doctoral thesis (B.Sc. 1989., M.Sc. 1994., PhD. 2001). Position title is the Assistant Professor. Research and professional experience (1990 - 1994. Research Associate, 1994 – 2001. Teaching Assistant, 2001 – 2005. Teaching Associate, 2005 - Assistant Professor). As author and co-author, she published 5 scientific and 4 professional papers. She is the holder of one current occupant technological project. Speaks, writes and reads English language.

List of relevant titles published within the last five years:

No.	Title
1.	D. Beluhan, S. Beluhan, Hybrid Modelling Approach to On-line Estimation of Yeast Biomass Concentration in Industrial Bioreactor. *Biotechnology Letters*, 22 (8) (2000), 631-635.
2.	S. Beluhan, I. Karmelić, S. Novak, V. Marić, Partial Purification and Biochemical Characterization of Alkaline 5'-Phosphodiesterase from Barley Malt Sprouts, *Biotechnology Letters*, 25 (13) (2003). 1099-1103.
3.	S. Beluhan, V. Marić, *Umami* taste: from surplus brewer's yeast to 5'-ribonucleotides, Current Studies of Biotechnology, Vol. III - Food, Zagreb, 2003.
4.	S. Beluhan, Nova valorizacija sladnih klica, nusproizvoda sladara, Svijet piva. 6 (2001.), 35; 10-13.
5.	S. Beluhan, Okusne supstancije iz pivskog kvasca, Svijet piva 7 (2001), 37, 9-13.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	
2.	
3.	
4.	
5.	

I. BASIC DATA ON PROPOSED MODULE

Name of module: **ENZYME TECHNOLOGY**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): 1(I,II), 2 (III)

Module status: Ground, ElectiveA, Elective B: Elective A

Language:
Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full professor	**Jagoda**	**Šušković**
Scientific-educational title	name	surname

Number of ECTS points: 4

Total number of contact hours: 49

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	22
	Auditory Practice	
	Laboratory Practice	17
	Practicum	
	Seminar	10
	Field Work	

Requirements for signature to be appended

Regularly attending lectures and successfully finishing laboratory practices

Manner in which examination is taken: Written [ ] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

***Lectures*:** Introduction: origins of enzymes, nomenclature and classification, enzymes structure, history of enzyme technology. Applied kinetics of enzyme reactions, multienzyme reactions, inhibitions. Properties of enzymes and influence of different parameters on enzyme kinetics. Biosynthesis of enzymes by microorganisms. Methods of isolation and purification of enzymes. Immobilization and stabilization of enzymes: methods, kinetics and limitations. Bioreactors: ideal and non-ideal kinetics and diffusive limitations. Application of enzymes in biotechnology, food and other industries, analytical and scientific use, biosensors. Application of genetic engineering in biotechnological production of enzymes. Modification of enzymes by methods of protein engineering. Enzyme inhibitors. Thermophilic enzymes, enzymes in organic solvents. Legislative aspects of the use of industrial enzymes in the manufacture of food and food ingredients.

***Seminars*:** Biosynthesis, isolation and application of proteolytic, amylolytic and pectinolytic enzymes for the application in biotechnology and medicine.

Laboratory Practices: Immobilization of α-amylase in agar. Wohlgemuth method. Immobilization of alkaline protease in Ca-alginate. Anson method. Biosynthesis of α-amylase by submerged cultivation of *Bacillus subtilis* 2_1^+. Purification of enzymatic active filtrate. SDS-PAGE.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Basic knowledge about technological processes in enzyme production by microorganisms (bacteria, fungi) and about methods of isolation, purification and activity of industrial enzymes.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	S. Matošić, J. Šušković: Enzyme technology and enzyme engineering, Internal script, Faculty of Food Technology and Biotechnology, 1999.
2.	H. W. Blanch, D. S. Clark: Biochemical engineering, Marcel Dekker, New York, 1997.
3.	T. Godfrey, S. West: Industrial enzymology, Macmillan Press Ltd, London, 1996.
4.	T. Nagodawithana, G. Reed: Enzymes in food processing, Academic Press Inc., San Diego, 1993.
5.	M. F. Chaplin, C. Bucke: Enzyme technology, Cambridge University Press, Cambridge, 1990.

Recommended literature

No.	Title
1.	W. M. Fogarty, C. T. Kelly: Microbial enzymes and biotechnology, Elsevier Applied Science 1990.
2.	D. I. C. Wang et al. Fermentation and enzyme technology, John Wiley & Sons, New York, 1979.
3.	A. H. Rose: Microbial enzymes and bioconversions, Academic press, London, 1980.
4.	Enzyme Nomenclature.http://www.chem.qmul.ac.uk/iubmb/enzyme/
5.	Biocatalysts Food Enzymes. www.biocatalysts.com

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full proffesor	**Jagoda**	**Šušković**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of biochemical engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: lectures, seminars

E-mail address: jsusko@pbf.hr

Address of personal web page:

Date of last review: April 6, 2004

CV (no more than 1200 characters):

Prof. Jagoda Šušković was born in Klobuk, Ljubuški on November 7th, 1955. She was graduated on 1980 at Biotechnology study course, Faculty of Technology, University of Zagreb. She won master's degree on 1989 and Ph.D. on 1996. Since1980 she worked as a Junior Assistant, and since 1989 as Assistant on the Laboratory for Antibiotic and Enzyme Technology, Department of Biochemical Engineering, Faculty of Food Technology and Biotechnology, University of Zagreb. On 1997 she was appointed for Assistant Professor, then on 2000 for Associate Professor and on 2004 for Full Professor. Prof. Jagoda Šušković is a supervisor of postgraduate study "Biotechnology – Bioprocess Engineering" at the Faculty of Food Technology and Biotechnology. Her scientific work covers different fields of biotechnology, biochemical engineering and industrial microbiology, as well as biosynthesis optimization of microbial metabolites (antibiotics, alkaloids, enzymes, lactic acid) and probiotics and starter cultures production. She contributed and has been a supervisor of 20 diploma works, 2 Master Thesis and 2 Ph.D. She is a principal investigator of scientific project "Role of lactic acid bacteria in synbiotic effect". She has published 32 scientific papers (14 of them are Current Content cited). She speaks English and French.

List of relevant titles published within the last five years:

No.	Title
1.	J. Frece, B. Kos, I. K. Svetec, Z. Zgaga, V. Mrša, J. Šušković, Importance of S-layer proteins in probiotic activity of *Lactobacillus acidophilus* M92, *J. Appl.Microbiol. 98* (2005)285-292.
2.	B. Kos, J. Šušković, S. Vuković, M. Šimpraga, J. Frece, S. Matošić, Adhesion and Aggregation Ability of Probiotic Strain *Lactobacillus acidophilus* M92, *J. Appl. Microbiol. 94* (2003) 981-987.
3.	J. Šušković, B. Kos, J. Goreta, S. Matošić, Role of lactic acid bacteria and bifidobacteria in synbiotic effect, *Food Technol. Biotechnol. 39* (2001) 227-235.
4.	J. Šušković, B. Kos, S. Matošić, V. Besendorfer, The effect of bile salts on survival and morphology of a potential probiotic strain *Lactobacillus acidophilus* M92, *World J. Microbiol. Biotechnol. 16* (7) (2000) 673-678.
5.	B. Kos, J. Šušković, J. Goreta, S. Matošić, Effect of Protectors on the Viability of *Lactobacillus acidophilus* M92 in Simulated Gastrointestinal Conditions, *Food Technol. Biotechnol. 38* (2) (2000) 121-127.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	S. Matošić, J. Šušković: Enzyme technology and enzyme engineering, Internal script, Faculty of Food Technology and Biotechnology, 1999.
2.	J. Šušković, B. Kos, J. Frece, Enzyme technology and enzyme engineering, Internal script for laboratory practice, Faculty of Food Technology and Biotechnology, 2001.
3.	Consultants on the technological project: Enzymatic treatment of cellulose textile materials (MZT RH, TP-010117-03) 2002-2004.
4.	Z. Duvnjak, A. Budimir, J. Šušković, Utjecaj pivskog tropa na proizvodnju alfa-amilaze pomoću bakterije *Bacillus subtilis* 2+1. *Prehrambeno-tehnološka revija, 21* (1983) 97-101.
5.	

Curriculum course (subject) instructor:

Assistant professor	**Blaženka**	**Kos**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of biochemical engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: seminars, practical work

E-mail address: bkos@pbf.hr

Address of personal web page:

Date of last review: July 7, 2004

CV (no more than 1200 characters):

Dr. Blaženka Kos was born in Zagreb, Croatia on October 23rd, 1968. She defended Diploma work in 1992, Master Thesis in 1996 and PhD Thesis in 2001 on the Faculty of Food Technology and Biotechnology, University of Zagreb. In 1992 she started to work as a Junior Researcher, in 1996 as Assistant, and in 2002 as a Senior Assistant on the Laboratory for Antibiotic and Enzyme Technology, Department of Biochemical Engineering, Faculty of Food Technology and Biotechnology, University of Zagreb. In 2004 she was appointed for Assistant Professor. She worked as a collaborator on the scientific projects „Physiological activity of native and r-DNA microorganisms“, „Probiotic activity of lactic acid bacteria“ and „Hypocholesterolemic activity of lactic acid bacteria“. From 2002 she is researcher on the project „Role of lactic acid bacteria in synbiotic effect“. She has published 14 scientific papers (10 of them are cited in Current Content) and she has participated with 20 presentations on the scientific conferences in the country and abroad. From January 12th until April 12th 2004 she was guest researcher (FEMS fellowship) in the prof. F. Canganella Laboratory, Department of Agrobiology and Agrochemisty, University of Tuscia, Viterbo, Italy. In 2001 she participated on “Bioprocess Engineering Course" of European Federation of Biotechnology (Brač, Croatia). She speaks English.

List of relevant titles published within the last five years:

No.	Title
1.	J. Frece, B. Kos, I. K. Svetec, Z. Zgaga, V. Mrša, J. Šušković, Importance of S-layer proteins in probiotic activity of *Lactobacillus acidophilus* M92, *J. Appl.Microbiol. 98* (2005)285-292.
2.	B. Kos, J. Šušković, S. Vuković, M. Šimpraga, J. Frece, S. Matošić, Adhesion and Aggregation Ability of Probiotic Strain *Lactobacillus acidophilus* M92, *J. Appl. Microbiol. 94* (2003) 981-987.
3.	J. Šušković, B. Kos, J. Goreta, S. Matošić, Role of lactic acid bacteria and bifidobacteria in synbiotic effect, *Food Technol. Biotechnol. 39* (2001) 227-235.
4.	J. Šušković, B. Kos, S. Matošić, V. Besendorfer, The effect of bile salts on survival and morphology of a potential probiotic strain *Lactobacillus acidophilus* M92, *World J. Microbiol. Biotechnol. 16* (7) (2000) 673-678.
5.	B. Kos, J. Šušković, J. Goreta, S. Matošić, Effect of Protectors on the Viability of *Lactobacillus acidophilus* M92 in Simulated Gastrointestinal Conditions, *Food Technol. Biotechnol. 38* (2) (2000) 121-127.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	J. Šušković, B. Kos, J. Frece, Enzyme technology and enzyme engineering, Internal script for laboratory practice, Faculty of Food Technology and Biotechnology, 2001.
2.	
3.	
4.	
5.	

I. BASIC DATA ON PROPOSED MODULE

Name of module: **ANTIBIOTIC TECHNOLOGY**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): 1(I, II), 2 (III)

Module status: Ground, ElectiveA, Elective B: Elective A

Language:
Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full professor	**Jagoda**	**Šušković**
Scientific-educational title	name	surname

Number of ECTS points: 4

Total number of contact hours: 49

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	24
	Auditory Practice	
	Laboratory Practice	11
	Practicum	
	Seminar	6
	Field Work	8

Requirements for signature to be appended

Regularly attending lectures and successfully finishing laboratory practices

Manner in which examination is taken: Written [ ] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

***Lectures*:** Industrial production of antibiotics. Technological processes of antibiotic biosynthesis: media, microorganisms, equipment, cultivation conditions. Antibiotic isolation. Filtration, extraction, sedimentation, ionic exchange, drying, formulation of antibiotics. Modelling and process control, activity of antibiotics. Biotechnological production of penicillin, biosynthesis, chemical characteristics, activity. Isolation of penicillin. Production of semisynthetic penicillins. Biotechnological production of other β-lactam antibiotics (cephalosporines, clavulanic acid, cephamicines). Biotechnological production of tetracyclines. Biotechnological production of peptide antibiotics. Biotechnological production of macrolides. Review of other antibiotics: aromatic, glycopeptides, antifungal, antitumor antibiotics.
***Seminars*:** Calculation of biosynthesis and isolation processes of oxytetracyclines (OTC) and penicillin's isolation.
Laboratory Practices: Biosynthesis of oxytetracyclines by submerged cultivation of *Streptomyces rimosus.*
Fieldwork: Visit to pharmaceutical companies PLIVA, Zagreb and BELUPO, Koprivnica.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Basic knowledge about technological processes in industrial antibiotic production by microorganisms (bacteria, fungi) and about methods of isolation, purification and activity of antibiotics.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	S. Matošić, J. Šušković: Biotechnological production of Drugs and Specific Chemicals (antibiotics, alkaloids), Internal script, Faculty of Food Technology and Biotechnology, 1999.
2.	W. R. Strohl: Biotechnology of antibiotics, Marcel Dekker, Inc. New York, 1997.
3.	E. J. Vandamme: Biotechnology of industrial antibiotic, Marcel Dekker, Inc. New York, 1984.
4.	V. Betina: Bioactive secondary metabolites of microorganisms, Elsevier, Amsterdam 1994.
5.	Secondary metabolites: their function and evolution CIBA Foundation Symposium

Recommended literature

No.	Title
1.	The Microbial World: Penicillin and other antibiotics http://helios.bto.ed.ac.uk/bto/microbes/penicill.htm
2.	Antibiotics: Antibacterial Agents http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/A/Antibiotics.html
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full proffesor	**Jagoda**	**Šušković**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of biochemical engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: lectures, fieldwork

E-mail address: jsusko@pbf.hr

Address of personal web page:

Date of last review: April 6, 2004

CV (no more than 1200 characters): Prof. Jagoda Šušković was born in Klobuk, Ljubuški on November 7th, 1955. She was graduated on 1980 at Biotechnology study course, Faculty of Technology, University of Zagreb. She won master's degree on 1989 and Ph.D. on 1996. Since1980 she worked as a Junior Assistant, and since 1989 as Assistant on the Laboratory for Antibiotic and Enzyme Technology, Department of Biochemical Engineering, Faculty of Food Technology and Biotechnology, University of Zagreb. On 1997 she was appointed for Assistant Professor, then on 2000 for Associate Professor and on 2004 for Full Professor. Prof. Jagoda Šušković is a supervisor of postgraduate study "Biotechnology – Bioprocess Engineering" at the Faculty of Food Technology and Biotechnology. Her scientific work covers different fields of biotechnology, biochemical engineering and industrial microbiology, as well as biosynthesis optimization of microbial metabolites (antibiotics, alkaloids, enzymes, lactic acid) and probiotics and starter cultures production. She contributed and has been a supervisor of 20 diploma works, 2 Master Thesis and 2 Ph.D. She is a principal investigator of scientific project "Role of lactic acid bacteria in synbiotic effect". She has published 32 scientific papers (14 of them are Current Content cited). She speaks English and French.

List of relevant titles published within the last five years:

No.	Title
1.	J. Frece, B. Kos, I. K. Svetec, Z. Zgaga, V. Mrša, J. Šušković, Importance of S-layer proteins in probiotic activity of *Lactobacillus acidophilus* M92, *J. Appl.Microbiol. 98* (2005)285-292.
2.	B. Kos, J. Šušković, S. Vuković, M. Šimpraga, J. Frece, S. Matošić, Adhesion and Aggregation Ability of Probiotic Strain *Lactobacillus acidophilus* M92, *J. Appl. Microbiol. 94* (2003) 981-987.
3.	J. Šušković, B. Kos, J. Goreta, S. Matošić, Role of lactic acid bacteria and bifidobacteria in synbiotic effect, *Food Technol. Biotechnol. 39* (2001) 227-235.
4.	J. Šušković, B. Kos, S. Matošić, V. Besendorfer, The effect of bile salts on survival and morphology of a potential probiotic strain *Lactobacillus acidophilus* M92, *World J. Microbiol. Biotechnol. 16* (7) (2000) 673-678.
5.	B. Kos, J. Šušković, J. Goreta, S. Matošić, Effect of Protectors on the Viability of *Lactobacillus acidophilus* M92 in Simulated Gastrointestinal Conditions, *Food Technol. Biotechnol. 38* (2) (2000) 121-127.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	S. Matošić, J. Šušković: Biotechnological production of Drugs and Specific Chemicals (antibiotics, alkaloids), Internal script, Faculty of Food Technology and Biotechnology, 1999.
2.	J. Šušković, B. Kos, J. Frece, Biotechnological production of Drugs and Specific Chemicals (antibiotics, alkaloids), Internal script for laboratory practice, Faculty of Food Technology and Biotechnology, 2001.
3.	S. Matošić, M. Mehak, J. Šušković, Physiological diferentiation of alkaloid producing strains of *Claviceps purpurea* (Fr.) Tul. *Acta Bot. Croat.* 53 (1994) 21-30.
4.	S. Matošić, M. Mehak, J. Šušković, Z. Golob, Effect of antifoams on the biosynthesis of ergot alkaloids by high-productive strain of *Claviceps paspali* F-2057. *Acta Bot. Croat.* 53 (1994)
5.	

Curriculum course (subject) instructor:

Assistant professor	**Blaženka**	**Kos**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of biochemical engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: seminars, practical work, fieldwork

E-mail address: bkos@pbf.hr

Address of personal web page:

Date of last review: July 7, 2004

CV (no more than 1200 characters):

Dr. Blaženka Kos was born in Zagreb, Croatia on October 23rd, 1968. She defended Diploma work in 1992, Master Thesis in 1996 and PhD Thesis in 2001 on the Faculty of Food Technology and Biotechnology, University of Zagreb. In 1992 she started to work as a Junior Researcher, in 1996 as Assistant, and in 2002 as a Senior Assistant on the Laboratory for Antibiotic and Enzyme Technology, Department of Biochemical Engineering, Faculty of Food Technology and Biotechnology, University of Zagreb. In 2004 she was appointed for Assistant Professor. She worked as a collaborator on the scientific projects „Physiological activity of native and r-DNA microorganisms“, „Probiotic activity of lactic acid bacteria“ and „Hypocholesterolemic activity of lactic acid bacteria“. From 2002 she is researcher on the project „Role of lactic acid bacteria in synbiotic effect“. She has published 14 scientific papers (10 of them are cited in Current Content) and she has participated with 20 presentations on the scientific conferences in the country and abroad. From January 12th until April 12th 2004 she was guest researcher (FEMS fellowship) in the prof. F. Canganella Laboratory, Department of Agrobiology and Agrochemisty, University of Tuscia, Viterbo, Italy. In 2001 she participated on “Bioprocess Engineering Course" of European Federation of Biotechnology (Brač, Croatia). She speaks English.

List of relevant titles published within the last five years:

No.	Title
1.	J. Frece, B. Kos, I. K. Svetec, Z. Zgaga, V. Mrša, J. Šušković, Importance of S-layer proteins in probiotic activity of *Lactobacillus acidophilus* M92, *J. Appl.Microbiol. 98* (2005)285-292.
2.	B. Kos, J. Šušković, S. Vuković, M. Šimpraga, J. Frece, S. Matošić, Adhesion and Aggregation Ability of Probiotic Strain *Lactobacillus acidophilus* M92, *J. Appl. Microbiol. 94* (2003) 981-987.
3.	J. Šušković, B. Kos, J. Goreta, S. Matošić, Role of lactic acid bacteria and bifidobacteria in synbiotic effect, *Food Technol. Biotechnol. 39* (2001) 227-235.
4.	J. Šušković, B. Kos, S. Matošić, V. Besendorfer, The effect of bile salts on survival and morphology of a potential probiotic strain *Lactobacillus acidophilus* M92, *World J. Microbiol. Biotechnol. 16* (7) (2000) 673-678.
5.	B. Kos, J. Šušković, J. Goreta, S. Matošić, Effect of Protectors on the Viability of *Lactobacillus acidophilus* M92 in Simulated Gastrointestinal Conditions, *Food Technol. Biotechnol. 38* (2) (2000) 121-127.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	J. Šušković, B. Kos, J. Frece, Biotechnological production of Drugs and Specific Chemicals (antibiotics, alkaloids), Internal script for laboratory practice, Faculty of Food Technology and Biotechnology, 2001.
2.	
3.	
4.	
5.	

I. BASIC DATA ON PROPOSED MODULE

Name of module: **BIOTECHNOLOGY IN ENVIRONMENT PROTECTION**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester):

Module status: Ground, ElectiveA, Elective B Ground

Language: english

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

assistant professor	**Tibela**	**Landeka Dragičević**
Scientific-educational title	name	surname

Number of ECTS points 4

Total number of contact hours: 52

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	16
	Auditory Practice	
	Laboratory Practice	22
	Practicum	4
	Seminar	6
	Field Work	4

Requirements for signature to be appended

Attendance of lectures, seminars and laboratory practice.

Manner in which examination is taken: Written [X] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

The role and importance of biotechnology in environmental protection. Basic principles of biogeochemical cycles. Bioremediation in nature. Biotechnological processes applied in environmental protection of water, air and soil. Treatment of wastewater. Wastewater treatment methods: pre-treatment, primary, secondary and tertiary treatment. Biological removal of substances with carbon, nitrogen, phosphorus and sulfur and of micropollutants-xenobiotics aimed at environmental protection. Administration of ionic exchangers and membranous bioreactors. Bioremediation of soil. Removal of biodegradable substances from the air. Bioaugmentation method. New monitoring methods for environmental impurities. Modern methods for monitoring of microorganisms used for environmental protection. Genetically modificated microorganisms in environmental protection. Mathematical modelling of biotechnological processes. National and international regulations on environmental protection. A visit-touring of the wastewater treatment system, incinerator, landfills and a composting plant.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

In addition to basic facts, the students are introduced with the latest achievements and findings about implementation of various bioprocesses in environmental protection.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	Rehm, H.J., Reed, G., Stadler, P. "Biotechnology. Special Topics: Environmental Process", (Ed. J. Winter), VCH Verlag, Weinheim, 1999.
2.	Water Environment Federation "Operation of Municipal Wastewater Treatment Plants" Manual of practice No.11, Fifth ed., Water Environment Federation, Alexandria, USA, 1996.
3.	Glancer-Šoljan, M., Landeka Dragičević, T., Šoljan, V., Ban, S. "Biološka obradba otpadnih voda" Course material, (Ed. Kugler), Zagreb, 2002.
4.	
5.	

Recommended literature

No.	Title
1.	Metcalf & Eddy Inc. "Wastewater Engineering, Treatment, Disposal, Reuse", Mc Graw-Hill Book Company, New York, 1991.
2.	"Advanced Wastewater Treatment. Nutrient Removal and Anaerobic Proces", (Ed. A. Mudler), Pergamon Press, London, 1997.
3.	Demain, A.L., Davies, J.E. "Manual of Industrial Microbiology and Biotechnology" 2nd Ed. (Eds. R.M. Atlas et.al.) ASM Press, Washington, D.C., USA, 1999.
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

assistant professor	Tibela	Landeka Dragičević
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Food Technology Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: Lectures, seminars and practice

E-mail address: tdragic@pbf.hr

Address of personal web page:

Date of last review: 13.02.2002.

CV (no more than 1200 characters):

Tibela Landeka Dragičević born in Vinkovici on 1 November 1967. Graduated from primary and secondary school in Vinkovci and from the Faculty of Food Technology, University of Osijek (1990). Began post-graduate studies, course biochemical engineering, at the Faculty of Food Technology and Biotechnology, University of Zagreb (1990) wherefrom she took her MSc in 1993 and PhD in 1995 (biotechnical sciences). Her scientific-research work relates to microbial ecology. Ms Landeka Dragičević has had vocational trainings in the treatment of wastewater in different countries (Croatia, Czech Republic, Slovenia and Austria). She has been actively engaged in realization of several national scientific projects and the international FP6 "SARIB-project". She is the mentor of several BSc and one MSc work. Since 1991 she works at the Faculty of Food Technology and Biotechnology. Assistant professor from 2002.

List of relevant titles published within the last five years:

No.	Title
1.	Landeka Dragičević, T., Zanoški, M., Glancer-Šoljan, M., Šoljan, V., Matić, V., Krajina , J. (2004) Activity of the granulated biomass of the mixed microbial culture for highly efficient carbon and nitrogen removal in the process wastewater. Proceedings of the European Symposium on Environmental Biotechnology, ESEB 2004, (Ed. W. Verstraete), 25-28 April 2004, Oostende, Belgium, 645-648.
2.	Čačić, Lj., Šoljan, V., Dragičević, T.L., Glancer-Šoljan, M., Vuksan, B., Krivohlavek, A. (2002) The removal of nitrogen substances from a chemically defined medium by the addition of liner alkylbenzene sulfonate (LAS) using a mixed bacterial culture of nitrificants and denitrificants. Limnological reports. Proceedings of the 34th Conference in Tulcea, August 2002 (Eds. G. Brezeanu, R. Stiuca), Tulcea, Romania, Vol. **34**, 21-30.
3.	Glancer-Šoljan, M., Ban, S., Landeka Dragičević, T., Šoljan, V., Matić, V. (2001) Granulated mixed microbial culture suggesting successful employment of bioaugmentation in the treatment of process wastewater. *Chem.Biochem.Eng.Q.* **15** (3), 87-94.
4.	Glancer-Šoljan, M., Šoljan, V., Landeka Dragičević, T., Čačić. Lj. (2001) Aerobic degradation of formaldehyde in wastewater from the production of melamine resins. *Food technol. biotechnol.* **39** (3), 197-202.
5.	

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Presently, coordinator of two undergraduate courses at the Zagreb university
2.	Mentor of one Mr. Thesis and a few diploma theses
3.	Co-author of course material "Biološka obradba otpadnih voda", (2002), Ed. Kugler, Zagreb
4.	Scientific competence – investigator on four scientific projects (one international)
5.	Several public lectures at home and aboard

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

full professor	Margareta	Glancer-Šoljan
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Food Technology Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Lectures and seminars

E-mail address: mglancer@pbf.hr

Address of personal web page:

Date of last review: 12.01.1999.

CV (no more than 1200 characters):

Margareta Glancer-Šoljan, born in Teslić (Bosnia and Herzegovina) in 1944 where she graduated from the primary school and secondary technical school (chemistry). Took BSc from the Faculty of Technology in Tuzla (1971). Post-graduate studies in chemical engineering began at the Faculty of Technology in Zagreb (1973) where she took her MSc and PhD in process engineering (1976 and 1977 respectively). Years 1978 and 1979 spent at the Massacussets Institute of Technology (MIT) Cambridge, USA. From 1971 worked as technical associate at Department of Biotechnology, Faculty of Technology in Zagreb. In 1973 elected at the same Faculty for an assistant professor and in 1979 for a associated professor. In 1986 became a professor at the Faculty of Food Technology and Biotechnology, University of Zagreb (graduate and post-graduate studies in the treatment of wastewater and waste materials). Mentored over 80 MSc and 8 PhD theses. Leader of five national and two international scientific projects. Awarded «Nikola Tesla» and «Kliment Ohridski» awards (1988, IFIA 1995 and ARCA 2003). Published over 60 scientific works.

List of relevant titles published within the last five years:

No.	Title
1.	Landeka Dragičević, T., Zanoški, M., Glancer-Šoljan, M., Šoljan, V., Matić, V., Krajina , J. (2004) Activity of the granulated biomass of the mixed microbial culture for highly efficient carbon and nitrogen removal in the process wastewater. Proceedings of the European Symposium on Environmental Biotechnology, ESEB 2004, (Ed. W. Verstraete), 25-28 April 2004, Oostende, Belgium, 645-648.
2.	Čačić, Lj., Šoljan, V., Dragičević, T.L., Glancer-Šoljan, M., Vuksan, B., Krivohlavek, A. (2002) The removal of nitrogen substances from a chemically defined medium by the addition of liner alkylbenzene sulfonate (LAS) using a mixed bacterial culture of nitrificants and denitrificants. Limnological reports. Proceedings of the 34th Conference in Tulcea, August 2002 (Eds. G. Brezeanu, R. Stiuca), Tulcea, Romania, Vol. **34**, 21-30.
3.	Glancer-Šoljan, M., Ban, S., Landeka Dragičević, T., Šoljan, V., Matić, V. (2001) Granulated mixed microbial culture suggesting successful employment of bioaugmentation in the treatment of process wastewater. *Chem.Biochem.Eng.Q.* **15** (3), 87-94.
4.	Glancer-Šoljan, M., Šoljan, V., Landeka Dragičević, T., Čačić. Lj. (2001) Aerobic degradation of formaldehyde in wastewater from the production of melamine resins. *Food technol. biotechnol.* **39** (3), 197-202.
5.	

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Glancer-Šoljan, M., Landeka Dragičević, T., Šoljan, V., Ban, S. (2002) Biološka obradba otpadnih voda. Course material. Ed. Kugler, Zagreb.
2.	Glancer-Šoljan, M. (1993) New technologies for biological treatment of municipal and industrial waste waters by using suitable microorganisms as starter culture. *Kem. Ind.* **42** (9), 323-330.
3.	Landeka, T., Šoljan, V., Glancer, M. (1993) Razgradnja tiocijanata odabranim sojevima bakterija i združenim mješovitim kulturama. *Prehrambeno-tehnol. botehnol. rev.* **31** (4), 137-143.
4.	Dvoraček, L., Glancer, M., Ban, S. (1989) Degradation of phenol in industrial waste waters. Part I: Selection of microorganisms. *Prehrambeno-tehnološka i biotehološka revija* **27** (2-3), 147-154.
5.	Glancer-Šoljan, M., Ban, S.N., Dvoraček, L. (1985) Biodegradacija betaina pomoću kvasca *Trichosporon* i mješovite kulture aktivnog mulja. *Prehrambeno-tehnološka revija,* **7** (1-2), 3-10.

Curriculum course (subject) instructor:

Full professor	Zoran	Zgaga
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Biochemical engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Lectures

E-mail address: zgazo@pbf.hr

Address of personal web page:

Date of last review: 2003

CV (no more than 1200 characters):

Born at April 13, 1956 in Zagreb, Croatia. In 1979 B. sc. in Biotechnology/Biochemistry at the Faculty of Technology, University of Zagreb. Ph. D. in 1990 at the Faculty of Food Technology and Biotechnology where he made his career from teaching and research assistant to full professor. Reach professional experience abroad (Franca, USA) where he spent more then three years working in prominent research institutes. His major research interests are the mechanisms of genetic alterations, structure and stability of the eukaryotic genome and he put together a research group working on yeast molecular genetics for the last 15 years. Investigator on four research projects (one EC-founded) and principal investigator on two projects. The results of his work were published in more then 20 papers that were quoted more then 130 times and he participated in numerous national and international scientific meetings. Member of several scientific and professional societies, boards, commissions and comities. Associate member of Croatian Academy of Engineering and member of the editorial board of international journal Food Technology and Biotechnology.

List of relevant titles published within the last five years:

No.	Title
1.	Lisnić, B., I.K. Svetec, H. Šarić, I. Nikolić and Z. Zgaga (2005) Palindrome content of the yeast *Saccharomyces cerevisiae* genome. Curr. Genet. (in press)
2.	Frece, J., B. Kos, I.K. Svetec, Z. Zgaga, V. Mrša and J. Šušković (2004) Importance of S-layer proteins in probiotic activity of *Lactobacillus acidophilus* M92. Journal of Applied Microbiology 98, 285-292.
3.	Svetec, I.K., B. Lisnić and Z. Zgaga (2002) A 110 bp palindrome stimulates plasmid integration in yeast. Period. Biolog. 104, 421-424.
4.	Svetec, I.K., D. Stjepandić, V. Borić, P.T. Mitrikeski and Z. Zgaga (2001) The influence of a palindromic insertion on plasmid integration in yeast. Food Technol. Biotechnol. 39, 169-173.
5.	Koren, P., I.K. Svetec, P.T. Mitrikeski and Z. Zgaga (2000) The influence of homology size and polymorphism on plasmid integration in the yeast *CYC1* region. Curr. Genet. 37, 292-297.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Presently, coordinator of three undergraduate and four graduate courses at the Zagreb university; invited lecturer at the international course Yeast Molecular Genetics, Theoretical and Practical Course; ICGEB, Trieste, 1999.
2.	Mentor of numerous diploma theses, four Mr. Theses and two Ph. Theses; five student works awarded with Zagreb university Rector award
3.	Several public lectures and appearances at home and abroad; five professional / popular articles published
4.	Scientific competence - investigator on four scientific projects (one EC-founded) and principal investigator on two projects in the field of molecular genetics
5.	

Curriculum course (subject) instructor:

Associated professor	Ivan	Mijatović
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Food Technology

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Lectures

E-mail address: imijat@pbf.hr

Address of personal web page:

Date of last review: 22.12. 2004.

CV (no more than 1200 characters):

Ivan Mijatović was born on November 3, 1948.in Zagreb, Croatia
Education: 1975, BSc. in Biotechnology, Faculty of Technology, Biotechnology department, University of Zagreb.
1979, MSc.in Ecology Engineering, Faculty of Technology, University of Zagreb.
1984, PhD. in Biotechnology, Faculty of Food technology and Biotechnology, University of Zagreb.
Employment:
1970, Technical collaborator in the Laboratory for water and fuel technology, Faculty of Food Technology and Biotechnology, University of Zagreb.
1975, Professional Collaborator in the same laboratory.
1979, Assistant in the laboratory for water and wastewater technology, Faculty of Food Technology and Biotechnology, University of Zagreb.
1984, Assistant professor on Faculty of Food Technology and Biotechnology, University of Zagreb
1998, Associate professor on Faculty of Food Technology and Biotechnology, University of Zagreb.
Scholarship:
1987- 1988, specialization in European Laboratories Rohm and Haas France, Department for Separation Technologies, Sophia Antipolis, Valbonne, France.
1992, University de Montpellier Institute Nacionale Researche Agronomic - INRA, Narbonne, France.
Published over twenty original scientific and professional papers and have been active on over hundred symposia or professional meetings.

List of relevant titles published within the last five years:

No.	Title
1.	S. Leaković, I. Mijatović, Š. Cerjan-Stefanović, E. Hodžić: Nitrogen removal from fertilizer wastewater by ion exchange, Wat. Res., 34, 185-190 (2000), CC, IDS Number:266MT; ISSN:0043-1354
2.	I. Mijatovic, M. Ahel, T. Ahel, M. Matosic, B. Mihaljevic: Treatment of a Landfill Leachate Containing Pharmaceutical Compounds by Nanofiltration and Activated Carbon Adsorption. IWA Specialized Conference on Water Environment-Membrane Technology Seoul, June 7-10, 2004, Proceedings Vol. 1, 359-365
3.	M. Matošić, I. Mijatović, E. Hodžić: Nitrate Removal from Drinking Water Using Ion Exchange – Comparasion of Chloride and Bicarbonate form of the Resins, Chem. Biochem. Eng. Q. 14(4) 141-146(2000), BCI, IDS Number:392VR; ISSN:0352-956
4.	T. Ahel, I. Mijatović, M. Matošić, M. Ahel: Nanofiltration of a Landfill Leachate Containing Pharmaceutical Intermediates from Vitamin C Production, Food Technol.Biotechnol. 42(2) 99-104 (2004)
5.	I. Mijatović, M. Matošić, B. Hajduk Černeha, D. Bratulić: Removal of natural organic matter by ultrafiltration and nanofiltration for drinking water production, Desalination 169(2004)223-230.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Book: I. Mijatović i suradnici: PRIPREMA VODE ZA HEMODIJALIZE, Hrvatska gospodarska komora, Zagreb, 2004. str.216
2.	24 Main technological projects for water treatment plants
3.	20 Technological projects for water treatment plants
4.	Mentor of 89 graduate students
5.	Mentor of 3 Master of science students, Mentor of 2 Ph.D. students

Curriculum course (subject) instructor:

full professor	Želimir	Kurtanjek
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Departement for Process Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Lectures

E-mail address: zkurtanjek@pbf.hr

Address of personal web page:

Date of last review: December 1st 2004.

CV (no more than 1200 characters):

Želimir Kurtanjek was born in 1946 in Zagreb, Croatia. In 1971 he graduated with the engineering degree in physics from the University of Zagreb. After graduation has was employed at the Faculty of Technology, Department in Sisak, University of Zagreb. In 1975 he enrolled at the postgraduate study at the Department of Chemical Engineering, The University of Houston, TX, USA. In 1979 he received his Ph.D. degree in chemical engineering. In 1980. he was employed at the Faculty of Food Technology and Biotechnology, University of Zagreb. He completed his postdoctoral studies at the Department of Chemical Engineering, University of Gent, Belgium. Through the EU project TEMPUS during 1991. he was a visiting professor at the Department of Biological Sciences, University of Ulster, Coleraine, Northern Ireland. Presently he is employed at Faculty of Food Technology and Biotechnology, University of Zagreb as a professor of chemical engineering and is teaching reactor engineering, mathematical modelling and process control to students of biotechnology. In his scientific work he is interested in modelling and control of reactors, modelling of bioprocesses and food engineering, and application of AI methods in process control. He is a member of international editorial boards of Chemical and Biochemical Engineering Quarterly, and Food Technology and Biotechnology journals.

List of relevant titles published within the last five years:

No.	Title
1.	M. Čurlin, M. Matić, M. Matošić, I. Mijatović, Ž. Kurtanjek, "Effects of Hydraulic Residence Time and Mixing on Wastewater Treatment in a Membrane Reactor", Chem. Biochem. Eng. Q. 18 (2) 97-104 (2004)
2.	Ž. Kurtanjek, "Simulation of Mammalian Cell Population Dynamics", Proceedings of 26-th Int. Conf. Information Technology Interfaces ITI 2004, Cavtat, June 7-10, 2004, p. 35-40, Zagreb
3.	Magdić D., Horvat D., Jurković Z., Sudar R., Kurtanjek Ž., "Chemometric Analysis of High Molecular Weight Glutenin Proportions and Image Data of Bread Crumb Structure from Croatian Wheat Cultivars", Food Technol.Biotechnol., 40 (4) 331-341 (2002)
4.	D. Vranešić, Ž. Kurtanjek, A.M. P. Santos, F. Maugeri, "Optimisation of Inulinase Production by Kluyveromyces bulgaricus", Food Technology and Biotechnology, 40 (1) 67-73 (2002)
5.	S. Matošić, Ž. Kurtanjek, M. Bošnjak, B. Šlaus, "Applicability of the three dimensional growth model in description of *Mucor miehei NCAIM 5238* cultivation and renin biosynthesis", *Chem. Biochem. Eng. Quart*., **15** (3), 98-101, 2001

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Ž. Kurtanjek, "Mjerenje i vođenje procesa", Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (author of a text book)
2.	Ž. Kurtanjek, "Reaktorsko inženjerstvo", Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (author of a text book)
3.	Ž. Kurtanjek, "Modeliranje i vođenje procesa", Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (author of a text book)
4.	J. Gajdoš, "Primjena neizrazitog modeliranja i optimiranja u planiranju društvene prehrane", Disertacija, Prehrambeno biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (mentor)
5.	D. Beluhan "Advanced bioprocess control by artificial intelligence algorithms: application in cultivation of yeast Saccharomyces cerevisiae", Disertacija, Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2000. (mentor)

I. BASIC DATA ON PROPOSED MODULE

Name of module: **TECHNOLOGY OF ALCOHOL AND YEAST**

Core course of studies for module: **BIOTECHNOLOGY**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): **1/I,II, 2/III**

Module status: Ground, ElectiveA, Elective B: A

Language: English

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full professor	**Slobodan**	**Grba**
Scientific-educational title	name	surname

Number of ECTS points: 4

Total number of contact hours: 50

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	20
	Auditory Practice	3
	Laboratory Practice	9
	Practicum	
	Seminar	12
	Field Work	6

Requirements for signature to be appended

Attended lectures, laboratory practice and seminars must be finished.

Manner in which examination is taken: Written [ ] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Lectures:

Production of alcohol: 10 hours

Principles of alcohol production. Yeasts in alcohol production. Mathematical analyses of ethanol fermentations. Schematic illustration of batch and continuous processes in the production of ethanol and yeast biomass on molasses. Production of alcohol on other substrates (corn, whey, ligno-cellulose). Separation of yeast biomass. Distillation and rectification of alcohol.

Production of yeast biomass: 10 hours

Technologies of yeast biomass production. Yeast strains in the industrial production. Principles of aerobic growth of bakers yeast. Procedures of the bakers yeast production. Separation of yeast biomass from fermented mash. Package of product. Production of dry bakers yeast. Production of food and feed yeasts on different media – schematic illustrations and descriptions.

Practice:

Pilot scale of the ethanol production in fed-batch process (anaerobic and semi-aerobic). Production of bakers yeast in fed-batch process with the controlled feeding of substrates (simulation of the industrial process in last generation of bakers yeast production). The process will be carried out in laboratory bioreactor up to 12 hours. Students will be working in groups for 3 hours. Field work will be organized as visit to the factories for alcohol and bakers yeast production.

Seminars:

Balances of the processes. Calculations and preparation of laboratory experiments in the ethanol and yeast biomass productions. Discussion and evaluation of achieved results.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

During education students will become familiar with technological processes in production of alcohol and yeast biomass. Besides that they will use their accomplishments (knowledge) for the running and control of industrial processes.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	Slobodan Grba (2005), Kvasci u Biotehnologiji (in preparation)
2.	Vladimir Marić (2000), Biotehnologija i Sirovine
3.	
4.	
5.	

Recommended literature

No.	Title
1.	Reed G. and Nagodawithana,T.W. (1991), Yeast technology, New York
2.	
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full professor	**Slobodan**	**Grba**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Food Technology and Engeenering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: **TECHNOLOGY OF ALCOHOL AND YEAST**

E-mail address: sgrba@pbf.hr

Address of personal web page:

Date of last review: 12 .01. 1999. Full professor

CV (no more than 1200 characters):

Dr.sc. Slobodan Grba was born in Narta, on 16.04. 1942.R.Croatia. Elementary and High School he attended in Croatia and was graduated at High School in Zagreb 1960. Study of Biotechnology on Faculty of Technology enrolled at the same year and ended the study in 1966. Post graduated study he finished 1973. at the University of Zagreb and become Ms. degree in biotechnology. After that he performed the Ph.D. Thesis in 1976. on the Faculty of Food Technology and Biotechnology, University of Zagreb. Professional work he started in PLIVA factory, in the production of antibiotics. After that (1969) he was elected as assistant in Department of Biotechnology for the subject of Fermentation technology at Faculty of Technology in Zagreb. Assistant professor at the same faculty become in 1979. As associated professor was elected in 1989 at the Faculty of Food Technology and Biotechnology in Zagreb. Full professor become in 1991.on the same faculty.

Today he is head of Laboratory of Fermentation Technology and Yeast at the Faculty of Food Technology and Biotechnology. During his professional training he attended ALKO Institute (Finland) for 18 months, twice 1971/72. 1974. and in USA for three weeks. His professional works resulted in the cooperation with industry almost all the time. He published 35 scientific papers and about 20 professional papers, technological studies, 1 patent, mainly in the field of fermentation technology and biochemical engineering.

List of relevant titles published within the last five years:

No.	Title
1.	Gulan Zetić, V., Stehlik-Tomas, V., Grba, S., Lutilsky, L., Kozlek, D.: Chromium Uptake by *Saccharomyces cerevisiae* and Isolation of Glucose Tolerance Factor from Yeast Biomass. (2001) *J. Biosci.* 26 (2) 217-223.
2.	Grba, S; Stehlik-Tomas, V; Stanzer, D; Vahčić, N; Škrlin, A: Selection of Yeast Strain *Kluyveromyces marxianus* for Alcohol and Biomass Production on Whey (2002) Chem. Bio. Eng. Q. 16 (1) 13-16.
3.	Stehlik-Tomas, V; Grba, S; Stanzer, D; Vahčić, Gulan-Zetić, V; Uptake of Iron by Yeast Cells and its Impact on Biomass Production (2003). Acta Alimentaria 32 (3) 279-287.
4.	Stehlik-Tomas, V; Gulan Zetić, V; Stanzer, D; Grba, S: Zinc, Copper and Manganese Enrichment in Yeast *Saccharomyces cerevisiae* (2004) Food Technology and Biotechnology, 42 (2) 115-120.
5.	Stanzer, D; Grba, S; Stehlik-Tomas, V; Gulan Zetić, V; Mrvčić,J. The Influence of molasses addition in whey on the kinetic of alcoholic fermentation by yeast *Kluyveromyces marxianus* (2004) Mljekarstvo 54 (1) 27-38.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Grba, S., Oura, E. Suomalainen, H., (1979) Formation of Trehalose and Glycogen in Growing Baker's Yeast, Finn.Chem.Lett. (2) 61.
2.	Strel, B., Grba, S., Marić. V., (1993) Enhancement of Biomass and Fermentation Activity of Surplus Brewers Yeast in a Fed-batch Process.
3.	Čović, Ž., Grba, S., Stehlik-Tomas, V. (1992) Optimisation of bakers Yeast Production, Preh.Biotehnol.Rev. 30(2-3)117.
4.	Grba, S., Bezmalinović, I., (1994).Technological procedures for the Production of Brewers Yeast *Saccharomyces uvarum* for bakery , Patent HR P-920067 B_1.
5.	Grba, S., and co. (2004) Technology project of Ministry of science, «Production of Alcohol and Food Yeast on Different Substrates TP-01/0058-07.

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

associate proffesor	**Vesna**	**Vesna Stehlik-Tomas**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor	Faculty of Food Technology and Biotechnology Department of Food Technology Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed:	**Technology of alcohol and yeast**
E-mail address:	vtomas@pbf.hr
Address of personal web page:	
Date of last review:	16.03.2000
CV (no more than 1200 characters):	Dr. sc. Vesna Stehlik-Tomas was born in Zagreb on January 25, 1947. She completed and graduated from high school in Zagreb in 1966. That year, she applied and was accepted to study in the Biotechnological Department of the Technological University in Zagreb (which later became the Faculty of Food Technology and Biotechnology) from which she graduated in 1974. She started working as a technician in the Laboratory of fermentation technology and biological treatment of the waste water. She defended Master thesis under the title «Biosynthesis of single cell proteins on the basis of yeast on whey» in 1983. She was selected as technical staff member in 1979 and have been working since 1989 as in the assistant. She completed Ph thesis in 1995 under the title «Preparation of mixed starter-cultures for bakery». Both academic degrees are in the area of biotechnical research, in the field of biotechnology and engineering branch. She was appointed in 1996 as assistant Professor and received asocciate Profesor tenure in 2000. She manage the technological project TP/0058-05 and she is a Team member of research project 0058022. She has published 20 scientific papers and 6 professional papers.

List of relevant titles published within the last five years:

No.	Title
1.	V.Gulan Zetić; **V. Stehlik-Tomas**; S. Grba; L. Lutilsky; D. Kozlek (2001): Chromium uptake by *Saccharomyces cerevisiae* and isolation of glucose tolerance factor from biomass. Journal of Biosciences 26 (*1*) 217-223
2.	S. Grba; **V. Stehlik-Tomas**; D. Stanzer; N. Vahčić; V. Gulan Zetić (2003): Uptake of Iron by Yeast Cells and its Impact on Biomass Prouction. Acta Allimentaria 32 (*3*) 279-287)
3.	**V. Stehlik-Tomas**; V. Gulan Zetić; D. Stanzer; S. Grba (2004): Enrichment in Yeast *Saccharomyces cerevisiae.* Food Technology and Biotechnology 42 (*2*) 115-120.
4.	D. Stanzer; S. Grba; **V. Stehlik-Tomas**; J. Mrvčić (2004): Utjecaj dodatka melase na kinetiku alkoholne feremtacije sirutke s pomoću kvasca *Kluyveromyces marxianus* Mljekarstvo 54 (*1*) 27-38.
5.	

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	**V. Stehlik-Tomas**; S. Grba (1997): Mangane Uptake by *Saccharomyces cerevisiae* and its Impact on the Kinetics of Alcohol Fermentation, Budimpešta, August 17-21, 199.
2.	S. Grba; **V. Stehlik-Tomas** (1991): Odabir soja kvasca *Saccharomyces cerevisiae* za industrijsku primjenu
3.	**V. Stehlik-Tomas**; S. Grba; D. Stanzer; N. Vahčić; V. Gulan Zetić (2003): Uptake of iron by yeast cells and its impact on biomass production. Acta Alimentaria 32 (*3*) 279-287.
4.	S. Grba; I. Bezmalinović; S. Županić; **V. Stehlik-Tomas** (1988): Odabir pogodnih emulgatora za proizvodnju suhog aktivnog kvasca. Prehrambeno-tehnološka i biotehnološka revija. 26 (*3*) 79-83.
5.	

I. BASIC DATA ON PROPOSED MODULE

Name of module: **TECHNOLOGY OF ANIMAL AND PLANT CELLS (ADBI06)**

Core course of studies for module: **GRADUATE STUDY OF BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [x] Append X in the appropriate box

Academic year in which module appears (semester): _____

Module status: Ground, ElectiveA, Elective B ElectiveA

Language: croatian (english)

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Tenure full professor	**Zlatko**	**Kniewald**
Scientific-educational title	name	surname

Te

Number of ECTS points 4

Total number of contact hours: 50

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	20
	Auditory Practice	
	Laboratory Practice	15
	Practicum	
	Seminar	15
	Field Work	

Requirements for signature to be appended

Regular attendance at the classes and successful finishing of the laboratory exercises

Manner in which examination is taken: Written [x] Oral [x] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Within this module lectures the students shall acquire the basic knowledge on the animal and plant cell properties, tissue structure and types of cells in culture as well as on their production properties. The application area of the animal cells, form animal cell biomass production, vaccine and monoclonal antibodies production, production of new tissues or organs to stem cell technology, shall be explained through the breeding conditions, role of media, production procedures and types of bioreactors that are applied as well as through the «scaling up» procedures. The procedures for monitoring cell vitality, proliferation, apoptotic or necrotic changes shall also be elaborated. The area of plant cell and tissue culture application as a resource of secondary products shall also be elaborated. Part of the lectures shall encompass the genetic transformation of the plant cells and the areas of transgenic animals employment.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Technologies of animal and plant cells – aseptic working technique, animal cells form working bank to bioreactor with application, hormones and growth stimulators, callus culture, plant cells with application.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	Z. Kniewald i sur.: Priručnik za pripravu i izolaciju biološki djelatnih supstancija, (ured. Z. Kniewald) (sveuč. prir.) Alfej d.o.o., Zagreb 2000
2.	R. Ian Freshney: Culture of Animal Cells – a manual of basic technique, fourth edition , Wiley-Liss Inc., New York 2000.
3.	Plant Biotechnology and Transgenic Plants (ured. K.-M. Oksman-Caldentey, W.H. Barz), Marcel Dekker. Inc., 2002.
4.	S. Jelaska: Kultura biljnih stanica i tkiva. Temeljna istraživanja i primjena, Školska kniga, Zagreb, 1994.
5.	Murakami, H., Shirahata, S., Tachibana, H. (1992) Animal Cell Technology: Basic & Applied Aspects, Vol. 4, Kluwer Academic Publisher, Dordrecht.
	Lydersen, B. K. (1987) Large Scale Cell Culture Technology, Hanser Publisher, Munich/ Vienna/ New York.
	Wilkins, M. B. (1984) Advanced Plant Physiology, Longman Scientific & Technical, New York.
	Präve, P., Faust, U., Sittig, W., Sukatsch, D. A. (1987) Basic Biotechnology (Hazzard, B. J.) VCH, Weinheim/New York.

Recommended literature

No.	Title
1.	D.E. Evans, J.O.D. Coleman, A. Kearns: Plant Cell Culture , BIOS Scientific Publishers, London, 2003.
2.	Fruit and Vegetable Biotechnology (ured. V. Valpuesta), Woodhead Publishing Limited, Cambridge, 2002.
3.	Hunkeler, D., Cherrington, A., Prokop, A., Rajotte, R. (2001) Bioartificial Organs III, Tissue Sourcing, Immunoisulation and Clinical Trials, The New York Academy of Science, New York.
4.	Kniewald, Z., (2000) Current Studies of Biotechnology, Vol. 1., Biomedicine, Hrvatsko Društvo za Biotehnologiju, Zagreb.
5.	Kniewald, Z., (2001) Current Studies of Biotechnology, Vol. 2., Environment, Hrvatsko Društvo za Biotehnologiju, Zagreb.
6.	Kniewld, Z., (2003) Current Studies of Biotechnology, Vol. 3., Food, Hrvatsko Društvo za Biotehnologiju, Zagreb.

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Tenure full professor	**Zlatko**	**Kniewald**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of biochemical engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [x] instructor [ ] Append X in the appropriate box

CV (no more than 1200 characters):

Born in Zagreb, Croatia, June 2, 1938. Croatian national. **Educ:** F.of Technol. – Dpt. of Biotechnology, U. of Zagreb, 1961; F. of Pharm. & Biochem. Zagreb, M. Sc. Phys. Chem, 1966; F. of Technol., U. of Zagreb, Ph. D. Biotech. Sci., 1970; Postgrad. study Inst. of Pharmacol., Milan, Italy, 1968-70; U. of Manchester, England, 1991, Semin. "Manag. res. in higher educ."; U. of Southampton, England, 1995, Semin. "Ind. and higher educ.: Working together". **Empl:**. "Žumberak" Fact., Savski Marof, 1961-65; Lab. for Exp. Med., Zagreb, 1965-75; Rep. Counc. for Scient. Work of the Soc. Rep. of Croatia, Zagreb, 1972-74; Rep. Comm. for Scient. Work of the Soc. Rep. of Croatia, Secretary-General, 1975-80; Fac. of Food Technol. and Biotechnol., 1980. **Elected (E.)** Assist. in the Lab. for Exp. Med, Zagreb, 1965; "Ruđer Bošković" Institute, E. Sen. Sci. Assoc., 1977; Facult. of Food Technol. and Biotechnol., E. Sci. Counsel., 1980; E. Full Prof. 1987, eval. for Full Prof. 1993, E. Tenure Full Prof., 1995. **ISI citation** > 600, CC sc. papers > 40, other pap. >95, 1 reg. patent, 1 reg. industr. designs. **Memb.:** Croat. Soc. of Biotech., Soc. Study of Reprod., USA, Sci. Counc. for Agricult. and For. of the Croat. Acad. of Sci. and Arts, Croat. Acad. of Eng., Full Memb. and Presid. (2003-05, 2005- 2nd mand.); The World Innov. Found., England, Hon. Mem., 2004, Croat. Eng. Assoc., Zagreb, Mem. of the Gov. Board, Biotech. Found. of the Fac. of Food Tech.. and Biotechn.., Zagreb, Manager. **Awards:** The "Ruđer Bošković" Ann. Award. for Sci. Work grant. by the Parliam. of the Soc. Rep. of Croatia, 1986, Med. of Lab. with Gold. Wreath, 1986; Fac. of Food Tech. and Biotech. Ann. Aw., 2001/02.

List of relevant titles published within the last five years:

No.	Title
1.	Z. Kniewald, V.Gaurina-Srček (2000): The effect of new growth promoter CABRPP on biomass production of BHK21 C13 cells. Current Studies of Biotechnology vol. I. Biomedicine (ured. Z. Kniewald) izd. Hrvatsko društvo za biotehnologiju, Zagreb, 61-68,
2.	J.Kniewald, M.Jakominić, A.Tomljenović, B.Šimić, P.Romac, Đ.Vranešić, Z.Kniewald (2000): Disordars of Male Rat Reproductive Tract under the Influence of Atrazine. Journal of Applied Toxicology 20**,** 61-68.
3.	A. Tomljenović, V. Zechner-Krpan, Z. Kniewald (2000): Hypothalamo-pituitary-ovarian axis in rats under the influence of gonadoliberin or atrazine. Current Studies of Biotechnology vol.I. Biomedicine (ured. Z. Kniewald) izd. Hrvatsko društvo za biotehnologiju, Zagreb, 69-74.
4.	A. Jeličić, V. Gaurina-Srček, D. Polančec, D. Sladić, Z. Kniewald (2001): Induction and detection of apoptosis in BHK21 C13 cells. Current Studies of Biotechnology vol.II. Environment (ured. Z.Kniewald) izd. Hrvatsko društvo za biotehnologiju, Zagreb.
5.	V. Gaurina Srček, S. Čajavec, D. Sladić, Z. Kniewald: BHK 21 C13 cells for Aujeszky's disease virus production using the multiple harvest process. Cytotechnology (accepted for publication in 2004.)

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Z.Kniewald, P.Mildner (1962) Nikotinamid adenozin dinukleotid (NAD) u pekarskom kvascu (Saccharomyces cerevisiae). Kemija u Industriji 4, 171-174.
2.	R.Massa, E.Stupnicka, Z.Kniewald, L.Martini (1972) The transformation of testosterone into dihydrotestosterone by the brain and the anterior pituitary. Journal of Steroid Biochemistry 3, 385-399
3.	Z.Kniewald, Z.Pučar (1976) Electrophoretic mobilities of ^{22}Na ^{90}Sr and ^{36}Cl ions in concentrated aqueous solutions of some inorganic 1:1, 2:1 and 2:2 salts and in see water. Journal of the Chemical Society, Faraday Transactions 1, 72 987-995.
4.	Z.Kniewald, J.Kniewald (1981) Mode of androgen action at male and female calf pituitary level. Journal of steroid Biochemistry 15 433-437.
5.	Z.Kniewald, S.Čajavec, V.Zechner-Krpan, I.Gmajnički, Lj.Markuš-Cizelj (1995) Upotreba animalnih stanica u proizvodnji cjepiva. Zbornik radova znanstveno-stručnog sastanka "Vakcinologija danas i sutra" (ured. D. Hajsig), izd. Hrvatsko mikrobiološko društvo, Zagreb, str. 67-75.
6.	More than 40 graduation thesis, 12 master's degrees and 3 doctorates; University textbook (1993.) and university manual (2000.)

Curriculum course (subject) instructor:

Full professor	**Jasna**	**Vorkapić-Furač**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of biochemical engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [x] Append X in the appropriate box

Title of curriculum module executed: lectures and laboratory practice

E-mail address: jvfurac@pbf.hr

Address of personal web page:

Date of last review: 2000. g.

CV (no more than 1200 characters):

Born on August 31, 1942, in Banja Luka, Bosnia-Herzegovina. Completed her elementary and secondary education in Karlovac. Graduated in 1967 from the Faculty of Technology – Department of Biotechnology, University of Zagreb. Obtained her M. Sc. at the Faculty of Science, University of Zagreb, in 1975, and her Ph. D. in 1984 at the Faculty of Technology, University of Zagreb. She spent sabbatical year 1973/74 in the USA as a Fulbright Fellow. 1967-1970 worked as Research Associate at the FTI, and 1970-1989 as Assistant at the Faculty of Food Technology and Biotechnology, University of Zagreb. In 1989 promoted to Scientific Associate, 1990 to Assistant Professor, 1996 to Associate Professor and 2000 to Full Professor at 3 undergraduate collegia at the Faculty of Food Technology and Biotechnology, University of Zagreb. She holds 2 and co-holds 1 collegia at the postgraduate study at the Faculty of Food Technology and Biotechnology, University of Zagreb. She was mentor of 11 papers awarded by the Rector's Award as well as 49 university diplomas, 2 MScs and 1 PhD. Worked on 8 scientific projects as co-investigator, principal investigator on 1 scientific and 1 expert project. Published 44 scientific and 2 expert papers and 4 chapters in books. Author of 1 and co-author of 2 intern scripts and 1 textbook. Participated at 21 international and 17 national meetings. Member of CBS, CSB, CMS and the international association EEMS.

List of relevant titles published within the last five years:

No.	Title
1.	K.Delonga, M.Krsnik-Rasol, V.Mrkić, V.Dragović-Uzelac, J.Vorkapić-Furač: "Glucosinolate patterns of field and in vitro grown horseradish (*Armoracia lapathifolia*) plants and tumor tissue" *Proceedings of Euro Food Chem XI Meeting*, Biologically-active phytochemicals in food (analysis, metabolism, bioavailability and function), Norwich 2001, FECS special publication No 269 (2001) 40-44.
2.	K.Delonga, V.Dragović-Uzelac, V.Mrkić, S.Kovač, J.Vorkapić-Furač: "Variation in glucosinolates composition and relationship between aliphatic and indole glucosinolates in cruciferous vegetables " *Current Studies of Biotechnology, Vol. III – Food*, Zagreb, (2003) 209-219.
3.	K.Delonga, Z.Šmit, V.Dragović-Uzelac, V.Mrkić, J.Vorkapić-Furač: "Hydrolysis Products of glucosinolates from white cabbage (*Brassica oleracea* L. var. *capitata*) and cauliflower (*Brassica oleracea* L. var.*botrytis*) analyzed by HPLC and GC/MS" *Proceedings of Euro Food Chem XI Meeting*, Biologically-active phytochemicals in food (analysis, metabolism, bioavailability and function), Norwich 2001, FECS special publication No 269 (2001) 213-217.
4.	K.Delonga, I.Radojčić, L.Duraković, V.Mrkić, J.Vorkapić-F**urač**, Duraković, Senadin: "Indole glucosinolates from white cabbage and cauliflower and their bioactive breakdown products" *Current Studies of Biotechnology, Vol. III – Food*, Zagreb, (2003) 219-228.
5.	I.Radojčić, K.Berković, K.Delonga, J.Vorkapić-Furač: "Inhibition efficiency of cabbage glucosinolates extracts on tin corrosion" *Proceedings of Euro Food Chem* XII (Strategies of safe food), Brugge (Belgium), Vol 1. FECS Event 279 (2003) 300-304.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Z. Kniewald i sur., Priručnik za pripravu i izolaciju biološki djelatnih supstancija, (sveuč. priručnik), Alfej d.o.o., Zagreb, 2000.
2.	K. Bajrović, Z. Kniewald, J.Vorkapić-Furač: "Stimulation of *Coleus blumei* Benth Callus Growth by 1-(6-Purinyl)-2,5-dimethylpyrrole" *Pharmazie* **48** (1993) 787.
3.	S.Raić, M.Pongračić, J.Vorkapić-Furač, A.Hergold-Brundić, A.Nagl, M.Mintas: "The Novel 6-(*N*-Pyrrolyl)purine Acyclic Nucleosides: ^{1}H and ^{13}C NMR and X-Ray Structural Study" *Nucleosides & Nucleotides* **15** (1996) 937.
4.	S.Raić, M.Pongračić, J.Vorkapić-Furač, D.Vikić-Topić, A.Hergold-Brundić, A.Nagl, M. Mintas: "New Acyclic Purine Nucleoside Analogues Containing Exocyclic Pyrrolo Moiety: Synthetic, NMR and X-ray Crystal Structure Studies" *Croat. Chem. Acta* **69** (1996) 967.
5.	Eleven graduation thesis, two master's degrees and one doctorate

I. BASIC DATA ON PROPOSED MODULE

Name of module: **PROBIOTICS AND STARTER CULTURES**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): 1(II)

Module status: Ground, ElectiveA, Elective B: Elective A

Language:

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full professor	**Jagoda**	**Šušković**
Scientific-educational title	name	surname

Number of ECTS points: 3

Total number of contact hours: 39

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	16
	Auditory Practice	
	Laboratory Practice	18
	Practicum	
	Seminar	
	Field Work	5

Requirements for signature to be appended

Regularly attending lectures and successfully finishing laboratory practices

Manner in which examination is taken: Written [ ] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Lectures: Taxonomy and phylogenesis of lactic acid bacteria and their biochemical and phisyological characteristics. Lactic acid bacteria as probiotics. History and development of probiotics. Autochthonous microflora of gastrointestinal tract. Microbial and metabolic interactions with allochthonous (probiotic) cultures in the gastrointestinal tract. Selection of strains for probiotic use. Mode of action of probiotics. Effect of probiotics on human health. Definition and mechanism of prebiotic action to improve human health. Use of probiotics and prebiotics in combination (synbiotics). Definition and history of starter cultures development. Role of starter cultures in food preservation. Bacteriocins and other antimicrobial substances production. Types of starter cultures. Concentrated starter cultures. Roles of plasmids in starter cultures. General and specific criteria for starter cultures selection. Starter cultures used in milk products. Starter cultures used in malolactic fermentation in wine. Starter cultures for meat and fish fermentation. Starter cultures for fermented vegetable products. Sauerkraut production. Cucumbers fermentation. Olive fermentation. Starter cultures for silage production. Starter cultures for sourdought bread production.
Laboratory Practice: Physiologically active biomass preparation. *In vitro* selection of probiotic strains. Physiological activity of starter cultures and probiotic strains during preparation and storage.
Field Work: Visit to food industry "Prehrana" in Varazdin.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Getting of knowledge about role of lactic acid bacteria in probiotic preparations or as starter cultures for production of different fermented foodstuffs. Knowledge acquisition about microbiology and physiology of lactic acid bacteria. Cultivation and isolation of lactic acid biomass for probiotic and functional starter culture production.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	J. Šušković, B. Kos: Probiotics and prebiotics, Internal script, 2000.
2.	R. J. Siezen, J. Kok, T. Abee, G. Schaafsma: Lactic acid bacteria: genetic,metabolism and applications, Kluwer Academic Publishers, Dordrecht, 2002.
3.	B. J. B. Wood, W. H. Holzapfel: The genera of lactic acid bacteria, Blackie Academic Professional, 1995.
4.	G. W. Tannock: Probiotics. A general review, Horizon Scientific Press, 1999.
5.	R. Fuller: Probiotics: The scientific basis, Chapman & Hall, London, 1992.

Recommended literature

No.	Title
1.	R. Fuller: Probiotics 2: Applications and practical aspects, Chapman & Hall, 1997.
2.	R. Fuller, G. Perdigon: Probiotics 3: Immunomodulation by the Gut Microflora and Probiotics, Kluwer Academic Publishers, 2000.
3.	Y. K. Lee, K. Nomoto, S. Salminen. S. L. Gorbach: Handbook of probiotics, John Wiley & Sons, 1999.
4.	S. E. Gilliland: Bacterial starter cultures for foods, CRS Press, Boca Raton, 1985.
5.	PROEUHEALTH. http://www.vtt.fi/virtual/proeuhealth/

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full proffesor	**Jagoda**	**Šušković**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of biochemical engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: lectures, fieldwork

E-mail address: jsusko@pbf.hr

Address of personal web page:

Date of last review: April 6, 2004

CV (no more than 1200 characters):

Prof. Jagoda Šušković was born in Klobuk, Ljubuški on November 7th, 1955. She was graduated on 1980 at Biotechnology study course, Faculty of Technology, University of Zagreb. She won master's degree on 1989 and Ph.D. on 1996. Since1980 she worked as a Junior Assistant, and since 1989 as Assistant on the Laboratory for Antibiotic and Enzyme Technology, Department of Biochemical Engineering, Faculty of Food Technology and Biotechnology, University of Zagreb. On 1997 she was appointed for Assistant Professor, then on 2000 for Associate Professor and on 2004 for Full Professor. Prof. Jagoda Šušković is a supervisor of postgraduate study "Biotechnology – Bioprocess Engineering" at the Faculty of Food Technology and Biotechnology. Her scientific work covers different fields of biotechnology, biochemical engineering and industrial microbiology, as well as biosynthesis optimization of microbial metabolites (antibiotics, alkaloids, enzymes, lactic acid) and probiotics and starter cultures production. She contributed and has been a supervisor of 20 diploma works, 2 Master Thesis and 2 Ph.D. She is a principal investigator of scientific project "Role of lactic acid bacteria in synbiotic effect". She has published 32 scientific papers (14 of them are Current Content cited). She speaks English and French.

List of relevant titles published within the last five years:

No.	Title
1.	J. Frece, B. Kos, I. K. Svetec, Z. Zgaga, V. Mrša, J. Šušković, Importance of S-layer proteins in probiotic activity of *Lactobacillus acidophilus* M92, *J. Appl.Microbiol. 98* (2005)285-292.
2.	B. Kos, J. Šušković, S. Vuković, M. Šimpraga, J. Frece, S. Matošić, Adhesion and Aggregation Ability of Probiotic Strain *Lactobacillus acidophilus* M92, *J. Appl. Microbiol. 94* (2003) 981-987.
3.	J. Šušković, B. Kos, J. Goreta, S. Matošić, Role of lactic acid bacteria and bifidobacteria in synbiotic effect, *Food Technol. Biotechnol. 39* (2001) 227-235.
4.	J. Šušković, B. Kos, S. Matošić, V. Besendorfer, The effect of bile salts on survival and morphology of a potential probiotic strain *Lactobacillus acidophilus* M92, *World J. Microbiol. Biotechnol. 16* (7) (2000) 673-678.
5.	B. Kos, J. Šušković, J. Goreta, S. Matošić, Effect of Protectors on the Viability of *Lactobacillus acidophilus* M92 in Simulated Gastrointestinal Conditions, *Food Technol. Biotechnol. 38* (2) (2000) 121-127.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	J. Šušković, B. Kos: Probiotics and prebiotics, Internal script, 2000.
2.	Principle investigator on the project: Role of lactic acid bacteria in synbiotic effect (MZT RH, 0058009) 2002. -
3.	1996-2002. investigator on the project: Probiotic activity of lactic acid bacteria (MZT RH, 058403)
4.	Supervisor of the Master thesis: Jadranka Frece, *In vitro* and *in vivo* investigations of the mechanism of probiotic action of *Lactobacillus acidophilus* M92, *Lactobacillus plantarum* L4 and *Enterococcus faecium* L3, Faculty of Food Technology and Biotechnology, University of Zagreb, 2003.
5.	J. Šušković, B. Brkić, S. Matošić: Mode of probiotic action of lactic acid bacteria. In: "Fermented dairy products in diet and dietetics", Živković, M. Hadžiosmanović, V. Oberiter (Eds.), Hrvatska akademija medicinskih znanosti - Senat, Zagreb (1996) pp. 21-34.

Curriculum course (subject) instructor:

Associate proffesor	**Vesna**	**Stehlik-Tomas**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Food Technology Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: lectures

E-mail address: vtomas@pbf.hr

Address of personal web page:

Date of last review: 16.03.2000

CV (no more than 1200 characters):

Dr. sc. Vesna Stehlik-Tomas was born in Zagreb on January 25, 1947. She completed and graduated from high school in Zagreb in 1966. That year, she applied and was accepted to study in the Biotechnological Department of the Technological University in Zagreb (which later became the Faculty of Food Technology and Biotechnology) from which she graduated in 1974. She started working as a technician in the Laboratory of fermentation technology and biological treatment of the waste water. She defended Master thesis under the title «Biosynthesis of single cell proteins on the basis of yeast on whey» in 1983. She was selected as technical staff member in 1979 and have been working since 1989 as in the assistant. She completed Ph thesis in 1995 under the title «Preparation of mixed starter-cultures for bakery». Both academic degrees are in the area of biotechnical research, in the field of biotechnology and engineering branch. She was appointed in 1996 as assistant Professor and received asocciate Profesor tenure in 2000. She manage the technological project TP/0058-05 and she is a Team member of research project 0058022. She has published 20 scientific papers and 6 professional papers.

List of relevant titles published within the last five years:

No.	Title
1.	V.Gulan Zetić; **V. Stehlik-Tomas**; S. Grba; L. Lutilsky; D. Kozlek (2001): Chromium uptake by *Saccharomyces cerevisiae* and isolation of glucose tolerance factor from biomass. Journal of Biosciences 26 (*1*) 217-223
2.	S. Grba; **V. Stehlik-Tomas**; D. Stanzer; N. Vahčić; V. Gulan Zetić (2003): Uptake of Iron by Yeast Cells and its Impact on Biomass Prouction. Acta Allimentaria 32 (*3*) 279-287)
3.	**V. Stehlik-Tomas**; V. Gulan Zetić; D. Stanzer; S. Grba (2004): Enrichment in Yeast *Saccharomyces cerevisiae.* Food Technology and Biotechnology 42 (*2*) 115-120.
4.	D. Stanzer; S. Grba; **V. Stehlik-Tomas**; J. Mrvčić (2004): Utjecaj dodatka melase na kinetiku alkoholne feremtacije sirutke s pomoću kvasca *Kluyveromyces marxianus* Mljekarstvo 54 (*1*) 27-38.
5.	

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	**V. Stehlik-Tomas**; S. Grba (1995): Application of Starter-Cultures for Baked Goods. prehrambeno-tehnološka i biotehnološka revija 33 (*4*) 161-165.
2.	**V. Stehlik-Tomas** (gl. istraživač tehnološkog projekta TP/0058-05) (2001): Proizvodnja kruha i peciva s pomoću mikrobnih starter-kultura
3.	**V. Stehlik-Tomas**; S. Grba; V. Gulan Zetić; D. Stanzer (2003): Novel Yeast and Starters in the production of Bread. Current Studies of Biotechnology-Volume III-Food, Kniewald, Zlatko (ur). Zagreb: hrvatsko društvo za biotehnologiju 131-137 (znanstveni rad)
4.	
5.	

Curriculum course (subject) instructor:

Assistant professor	Blaženka	Kos
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of biochemical engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: practical work, fieldwork
E-mail address: bkos@pbf.hr
Address of personal web page:
Date of last review: July 7, 2004
CV (no more than 1200 characters):

List of relevant titles published within the last five years:

No.	Title
1.	J. Frece, B. Kos, I. K. Svetec, Z. Zgaga, V. Mrša, J. Šušković, Importance of S-layer proteins in probiotic activity of *Lactobacillus acidophilus* M92, *J. Appl.Microbiol. 98* (2005)285-292.
2.	B. Kos, J. Šušković, S. Vuković, M. Šimpraga, J. Frece, S. Matošić, Adhesion and Aggregation Ability of Probiotic Strain *Lactobacillus acidophilus* M92, *J. Appl. Microbiol. 94* (2003) 981-987.
3.	J. Šušković, B. Kos, J. Goreta, S. Matošić, Role of lactic acid bacteria and bifidobacteria in synbiotic effect, *Food Technol. Biotechnol. 39* (2001) 227-235.
4.	J. Šušković, B. Kos, S. Matošić, V. Besendorfer, The effect of bile salts on survival and morphology of a potential probiotic strain *Lactobacillus acidophilus* M92, *World J. Microbiol. Biotechnol. 16* (7) (2000) 673-678.
5.	B. Kos, J. Šušković, J. Goreta, S. Matošić, Effect of Protectors on the Viability of *Lactobacillus acidophilus* M92 in Simulated Gastrointestinal Conditions, *Food Technol. Biotechnol. 38* (2) (2000) 121-127.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	J. Šušković, B. Kos: Probiotics and prebiotics, Internal script, 2000.
2.	Investigator on the project: Role of lactic acid bacteria in synbiotic effect (MZT RH, 0058009) 2002. -
3.	1996-2002. investigator on the project: Probiotic activity of lactic acid bacteria (MZT RH, 058403)
4.	1997-2002. investigator on the supported project: Hypocholesterolemic activity of lactic acid bacteria (MZT RH, 058001)
5.	B. Kos: Probiotic concept*: In vitro* investigation with selected lactic acid bacteria, PhD Thesis, Faculty of Food Technology and Biotechnology, University of Zagreb (2001).

I. BASIC DATA ON PROPOSED MODULE

Name of module: **MODELLING OF BIOTECHNOLOGY PROCESSES**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [x] Append X in the appropriate box

Academic year in which module appears (semester): 2(4)

Module status: Ground, ElectiveA, Elective B: Elec A

Language: English

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Prof. dr.sc.	Želimir	Kurtanjek
Scientific-educational title	name	surname

Number of ECTS points: 4

Total number of contact hours: 50

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	25
	Auditory Practice	
	Laboratory Practice	
	Practicum	10
	Seminar	5
	Field Work	

Requirements for signature to be appended

completed laboratory and seminar reports

Manner in which examination is taken: Written [x] Oral [x] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Systems view of bioprocess modelling. Stoichiometric models of biotechnological processes. Models and analysis of intracellular reactions - Metabolic Flux Analysis - Metabolic Flux Control. Nonstructured dynamic models of biotechnological processes. Structured and segregated dynamic models. Parameter estimation of models. Optimisation and process control. Application of evolutionary algorithms (AI, neural networks, fuzzy logic, genetic algorithm).

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Gain of systems view and integration of knowledge of biochemical engineering with mathematical and computer analysis.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	J. Nielsen, J. Villadsen, "*Bioreaction Engineering Principles*", Plenum Press, New York, 1999
2.	M. Shuler, F. Kargi "Bioprocess Engineering", Prentice Hall, New Jersy, 2002.
3.	J.E. Bailey and D. Ollis „Biochemical Engineering Fundamentals“, McGraw Hill, 1985
4.	
5.	

Recommended literature

No.	Title
1.	EFB Bioprocess Engineering Course - Brač, 2003
2.	Yong-Zai Lu "Industrial Intelligent Control", John Wiley, New York, 1998
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Prof. dr.sc.	Želimir	Kurtanjek
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Faculty of Food Technology and Biotechnology

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [x] instructor [x] Append X in the appropriate box

Title of curriculum module executed:	Modelling of biotechnological processes
E-mail address:	zkurt@pbf.hr
Address of personal web page:	www.pbf.hr/~zkurt
Date of last review:	1.12. 2004
CV (no more than 1200 characters):	Želimir Kurtanjek was born in 1946 in Zagreb, Croatia. In 1971 he graduated with the engineering degree in physics from the University of Zagreb. After graduation has was employed at the Faculty of Technology, Department in Sisak, University of Zagreb. In 1975 he enrolled at the postgraduate study at the Department of Chemical Engineering, The University of Houston, TX, USA. In 1979 he received his Ph.D. degree in chemical engineering. In 1980. he was employed at the Faculty of Food Technology and Biotechnology, University of Zagreb. He completed his postdoctoral studies at the Department of Chemical Engineering, University of Gent, Belgium. Through the EU project TEMPUS during 1991. he was a visiting professor at the Department of Biological Sciences, University of Ulster, Coleraine, Northern Ireland. Presently he is employed at Faculty of Food Technology and Biotechnology, University of Zagreb as a professor of chemical engineering and is teaching reactor engineering, mathematical modelling and process control to students of biotechnology. In his scientific work he is interested in modelling and control of reactors, modelling of bioprocesses and food engineering, and application of AI methods in process control. He is a member of international editorial boards of Chemical and Biochemical Engineering Quarterly, and Food Technology and Biotechnology journals.

List of relevant titles published within the last five years:

No.	Title
1.	M. Čurlin, M. Matić, M. Matošić, I. Mijatović, Ž. Kurtanjek, "Effects of Hydraulic Residence Time and Mixing on Wastewater Treatment in a Membrane Reactor", *Chem. Biochem. Eng. Q.* **18** (2) 97-104 (2004)
2.	D. Vranešić, Ž. Kurtanjek, A.M. P. Santos, F. Maugeri, "Optimisation of Inulinase Production by *Kluyveromyces bulgaricus*", *Food Technology and Biotechnology*, 40 (1) 67-73 (2002)
3.	S. Matošić, Ž. Kurtanjek, M. Bošnjak, B. Šlaus, "Applicability of the three dimensional growth model in description of *Mucor miehei NCAIM 5238* cultivation and renin biosynthesis", *Chem. Bioche. Eng. Quart*., **15** (3), 98-101, 2001.
4.	Ž. Kurtanjek, "Simulation of Mammalian Cell Population Dynamics", Proceedings of 26-th Int. Conf. *Information Technology Interfaces* ITI 2004, Cavtat, June 7-10, 2004, p. 35-40
5.	Ž. Kurtanjek, "Principal Component ANN for Modelling and Control of Baker's Yeast Production", *Journal of Biotechnology*, **65** (1998) 25-35.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

1.	Ž. Kurtanjek, "Mjerenje i vođenje procesa", Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (author of a text book)
2.	Ž. Kurtanjek, "Reaktorsko inženjerstvo", Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (author of a text book)
3.	Ž. Kurtanjek, "Modeliranje i vođenje procesa", Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (author of a text book)
4.	J. Gajdoš, "Primjena neizrazitog modeliranja i optimiranja u planiranju društvene prehrane", *Disertacija*, Prehrambeno biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (mentor)
5.	D. Beluhan "Advanced bioprocess control by artificial intelligence algorithms: application in cultivation of yeast *Saccharomyces cerevisiae*", *Disertacija*, Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2000. (mentor)

I. BASIC DATA ON PROPOSED MODULE

Name of module: **REACTOR ENGINEERING**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [x] Append X in the appropriate box

Academic year in which module appears (semester): 2(4)

Module status: Ground, ElectiveA, Elective B **Ground**

Language: English

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Prof. dr.sc.	Želimir	Kurtanjek
Scientific-educational title	name	surname

Number of ECTS points 4

Total number of contact hours: 50

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	25
	Auditory Practice	
	Laboratory Practice	
	Practicum	10
	Seminar	5
	Field Work	

Requirements for signature to be appended

completed laboratory and seminar reports

Manner in which examination is taken: Written [x] Oral [x] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Basics of ideal reactors (batch, semibatch, continuous, tubular). Balances of mass, energy and momentum in ideal reactors. Parameter analysis. Kinetics in ideal reactors. Parameter estimation and experiment design. Multiplicity of steady states and complex dynamic behaviour. Mixing time and residence time distribution for nonideal reactors. Evaluation of conversion of nonideal monophase reactors. Basics of multiphase reactors. Mass balances for reactors with fixed beds. Shell mass balances for porous catalytic pellets. Balances for reactors with biofilms. Balances for three-phase reactors. Control and optimisation of reactors.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Gain of systems view and integration of knowledge of balances for ideal and nonideal reactors, reactor optimisation

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	H.S. Fogler "*Elements of Chemical Reaction Engineering*", Prentice Hall, Engelwood Clifs, 1999.
2.	O. Levenspiel, "*Chemical Reaction Engineering*", John Wiley, New York (1984)
3.	
4.	
5.	

Recommended literature

No.	Title
1.	
2.	
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Prof. dr.sc.	Želimir	Kurtanjek
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Faculty of Food Technology and Biotechnology

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [x] instructor [x] Append X in the appropriate box

Title of curriculum module executed:	Reactor engineering
E-mail address:	zkurt@pbf.hr
Address of personal web page:	www.pbf.hr/~zkurt
Date of last review:	1.12. 2004
CV (no more than 1200 characters):	Želimir Kurtanjek was born in 1946 in Zagreb, Croatia. In 1971 he graduated with the engineering degree in physics from the University of Zagreb. After graduation has was employed at the Faculty of Technology, Department in Sisak, University of Zagreb. In 1975 he enrolled at the postgraduate study at the Department of Chemical Engineering, The University of Houston, TX, USA. In 1979 he received his Ph.D. degree in chemical engineering. In 1980. he was employed at the Faculty of Food Technology and Biotechnology, University of Zagreb. He completed his postdoctoral studies at the Department of Chemical Engineering, University of Gent, Belgium. Through the EU project TEMPUS during 1991. he was a visiting professor at the Department of Biological Sciences, University of Ulster, Coleraine, Northern Ireland. Presently he is employed at Faculty of Food Technology and Biotechnology, University of Zagreb as a professor of chemical engineering and is teaching reactor engineering, mathematical modelling and process control to students of biotechnology. In his scientific work he is interested in modelling and control of reactors, modelling of bioprocesses and food engineering, and application of AI methods in process control. He is a member of international editorial boards of Chemical and Biochemical Engineering Quarterly, and Food Technology and Biotechnology journals.

List of relevant titles published within the last five years:

No.	Title
1.	M. Čurlin, M. Matić, M. Matošić, I. Mijatović, Ž. Kurtanjek, "Effects of Hydraulic Residence Time and Mixing on Wastewater Treatment in a Membrane Reactor", *Chem. Biochem. Eng. Q.* **18** (2) 97-104 (2004)
2.	D. Vranešić, Ž. Kurtanjek, A.M. P. Santos, F. Maugeri, "Optimisation of Inulinase Production by *Kluyveromyces bulgaricus*", *Food Technology and Biotechnology*, 40 (1) 67-73 (2002)
3.	S. Matošić, Ž. Kurtanjek, M. Bošnjak, B. Šlaus, "Applicability of the three dimensional growth model in description of *Mucor miehei NCAIM 5238* cultivation and renin biosynthesis", *Chem. Bioche. Eng. Quart*., **15** (3), 98-101, 2001.
4.	Ž. Kurtanjek, "Simulation of Mammalian Cell Population Dynamics", Proceedings of 26-th Int. Conf. *Information Technology Interfaces* ITI 2004, Cavtat, June 7-10, 2004, p. 35-40
5.	Ž. Kurtanjek, "Principal Component ANN for Modelling and Control of Baker's Yeast Production", *Journal of Biotechnology*, **65** (1998) 25-35.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

1.	Ž. Kurtanjek, "Mjerenje i vođenje procesa", Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (author of a text book)
2.	Ž. Kurtanjek, "Reaktorsko inženjerstvo", Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (author of a text book)
3.	Ž. Kurtanjek, "Modeliranje i vođenje procesa", Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (author of a text book)
4.	J. Gajdoš, "Primjena neizrazitog modeliranja i optimiranja u planiranju društvene prehrane", *Disertacija*, Prehrambeno biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (mentor)
5.	D. Beluhan "Advanced bioprocess control by artificial intelligence algorithms: application in cultivation of yeast *Saccharomyces cerevisiae*", *Disertacija*, Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2000. (mentor)

I. BASIC DATA ON PROPOSED MODULE

Name of module: **TECHNOLOGY OF VITAMINS AND HORMONES (ADBI13)**

Core course of studies for module: **GRADUATE STUDY OF BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [x] Append X in the appropriate box

Academic year in which module appears (semester): _____

Module status: Ground, ElectiveA, Elective B ElectiveA

Language: croatian (english)
Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Tenure full professor	**Zlatko**	**Kniewald**
Scientific-educational title	name	surname

Number of ECTS points 4
Total number of contact hours: 50

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	20
	Auditory Practice	
	Laboratory Practice	20
	Practicum	
	Seminar	10
	Field Work	

Requirements for signature to be appended

Regular attendance at the classes and successful finishing of the laboratory exercises

Manner in which examination is taken: Written [x] Oral [x] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Within this module the students shall, through lectures and seminaries, learn on the definition, classification, nomenclature, chemical composition, meaning and role of vitamins and hormones in the organism. A special overview shall be presented concerning the water-soluble and the fat-soluble vitamins, including description of their properties and technological production procedures. The students shall learn as well on the production, raw materials, production and purification procedures of the central nervous system hormones and steroid hormones. During the laboratory exercises the students shall learn on the methods of vitamins and hormones synthesis and isolation. They shall also learn on the methods of their quantitative determination employing high performance liquid chromatography (HPLC).

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Acquisition of the basic notions on the role of vitamins and hormones in the organism, production procedures of those and the germane compounds and their formulation.

Literature (list should include details on publisher and year of publication):
Compulsory literature

No.	Title
1.	Z. Kniewald i sur., Priručnik za pripravu i izolaciju biološki djelatnih supstancija, (sveuč. priručnik), Alfej d.o.o., Zagreb, 2000.
2.	G.F. Combs Jr., The vitamins, Fundamental Aspects in Nutrition and Health, Academic Press, Inc., San Diego, 1998.

3.	Z. Kniewald, Vitamini i hormoni: proizvodnja i primjena (sveuč. udžbenik), Hrv. Sveuč. Naklada, Zagreb, 1993.
4.	H.P. Schmauder, Methods in biotechnology, Taylor &Francis Ltd., 1987
5.	Stryer, L. (1991) Biokemija (Vuk-Pavlović, S., Kućan, Ž.) Školska knjiga, Zagreb

Recommended literature

No.	Title
1.	W. Friedrich, Vitamins, Walter de Gruyter, Berlin-New York, 1988
2.	B. Green, R.E. Leake: Steroid hormones-a practical approach, IRL Press, 1987.
3.	Biotechnology drugo izdanje, (ured. H-J Rehm), Wiley-VCH, 2001.
4.	Renaville, R., Burny, A. (2001) Biotechnology in Animal Husbandry, Kluwer Academic Publishers, Dordrecht.
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Tenure full professor	**Zlatko**	**Kniewald**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of biochemical engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [x] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:	lectures and seminars
E-mail address:	zlatko.kniewald@pbf.hr
Address of personal web page:	http://www.pbf.hr/knic
Date of last review:	26. listopada 1995.
CV (no more than 1200 characters):	Born in Zagreb, Croatia, June 2, 1938. Croatian national. **Educ:** F.of Technol. – Dpt. of Biotechnology, U. of Zagreb, 1961; F. of Pharm. & Biochem. Zagreb, M. Sc. Phys. Chem, 1966; F. of Technol., U. of Zagreb, Ph. D. Biotech. Sci., 1970; Postgrad. study Inst. of Pharmacol., Milan, Italy, 1968-70; U. of Manchester, England, 1991, Semin. "Manag. res. in higher educ."; U. of Southampton, England, 1995, Semin. "Ind. and higher educ.: Working together". **Empl:**. "Žumberak" Fact., Savski Marof, 1961-65; Lab. for Exp. Med., Zagreb, 1965-75; Rep. Counc. for Scient. Work of the Soc. Rep. of Croatia, Zagreb, 1972-74; Rep. Comm. for Scient. Work of the Soc. Rep. of Croatia, Secretary-General, 1975-80; Fac. of Food Technol. and Biotechnol., 1980. **Elected (E.)** Assist. in the Lab. for Exp. Med, Zagreb, 1965; "Ruđer Bošković" Institute, E. Sen. Sci. Assoc., 1977; Facult. of Food Technol. and Biotechnol., E. Sci. Counsel., 1980; E. Full Prof. 1987, eval. for Full Prof. 1993, E. Tenure Full Prof., 1995. **ISI citation** > 600, CC sc. papers > 40, other pap. > 95, 1 reg. patent, 1 reg. industr. designs. **Memb.:** Croat. Soc. of Biotech., Soc. Study of Reprod., USA, Sci. Counc. for Agricult. and For. of the Croat. Acad. of Sci. and Arts, Croat. Acad. of Eng., Full Memb. and Presid. (2003-05, 2005- 2nd mand.); The World Innov. Found., England, Hon. Mem., 2004, Croat. Eng. Assoc., Zagreb, Mem. of the Gov. Board, Biotech. Found. of the Fac. of Food Tech.. and Biotechn.., Zagreb, Manager. **Awards:** The "Ruđer Bošković" Ann. Award. for Sci. Work grant. by the Parliam. of the Soc. Rep. of Croatia, 1986, Med. of Lab. with Gold. Wreath, 1986; Fac. of Food Tech. and Biotech. Ann. Aw., 2001/02.

List of relevant titles published within the last five years:

No.	Title
1.	Z. Kniewald, V.Gaurina-Srček (2000): The effect of new growth promoter CABRPP on biomass production of BHK21 C13 cells. Current Studies of Biotechnology vol. I. Biomedicine (ured. Z. Kniewald) izd. Hrvatsko društvo za biotehnologiju, Zagreb, 61-68,
2.	J.Kniewald, M.Jakominić, A.Tomljenović, B.Šimić, P.Romac, Đ.Vranešić, Z.Kniewald (2000): Disordars of Male Rat Reproductive Tract under the Influence of Atrazine. Journal of Applied Toxicology 20**,** 61-68.
3.	A. Tomljenović, V. Zechner-Krpan, Z. Kniewald (2000): Hypothalamo-pituitary-ovarian axis in rats under the influence of gonadoliberin or atrazine. Current Studies of Biotechnology vol.I. Biomedicine (ured. Z. Kniewald) izd. Hrvatsko društvo za biotehnologiju, Zagreb, 69-74.
4.	A. Jeličić, V. Gaurina-Srček, D. Polančec, D. Sladić, Z. Kniewald (2001): Induction and detection of apoptosis in BHK21 C13 cells. Current Studies of Biotechnology vol.II. Environment (ured. Z.Kniewald) izd. Hrvatsko društvo za biotehnologiju, Zagreb.
5.	V. Gaurina Srček, S. Čajavec, D. Sladić, Z. Kniewald: BHK 21 C13 cells for Aujeszky's disease virus production using the multiple harvest process. Cytotechnology (accepted for publication in 2004.)

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Z.Kniewald, P.Mildner (1962) Nikotinamid adenozin dinukleotid (NAD) u pekarskom kvascu (Saccharomyces cerevisiae). Kemija u Industriji 4, 171-174.
2.	R.Massa, E.Stupnicka, Z.Kniewald, L.Martini (1972) The transformation of testosterone into dihydrotestosterone by the brain and the anterior pituitary. Journal of Steroid Biochemistry 3, 385-399
3.	Z.Kniewald, Z.Pučar (1976) Electrophoretic mobilities of ^{22}Na ^{90}Sr and ^{36}Cl ions in concentrated aqueous solutions of some inorganic 1:1, 2:1 and 2:2 salts and in see water. Journal of the Chemical Society, Faraday Transactions 1, 72 987-995.
4.	Z.Kniewald, J.Kniewald (1981) Mode of androgen action at male and female calf pituitary level. Journal of steroid Biochemistry 15 433-437.
5.	Z.Kniewald, S.Čajavec, V.Zechner-Krpan, I.Gmajnički, Lj.Markuš-Cizelj (1995) Upotreba animalnih stanica u proizvodnji cjepiva. Zbornik radova znanstveno-stručnog sastanka "Vakcinologija danas i sutra" (ured. D. Hajsig), izd. Hrvatsko mikrobiološko društvo, Zagreb, str. 67-75.
6.	More than 40 graduation thesis, 12 master's degrees and 3 doctorates; University textbook (1993.) and university manual (2000.)

Curriculum course (subject) instructor:

Full professor	**Jasna**	**Vorkapić-Furač**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of biochemical engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [x] Append X in the appropriate box

Title of curriculum module executed:	lectures and laboratory practice
E-mail address:	jvfurac@pbf.hr
Address of personal web page:	
Date of last review:	2000. g.
CV (no more than 1200 characters):	Born on August 31, 1942, in Banja Luka, Bosnia-Herzegovina. Completed her elementary and secondary education in Karlovac. Graduated in 1967 from the Faculty of Technology – Department of Biotechnology, University of Zagreb. Obtained her M. Sc. at the Faculty of Science, University of Zagreb, in 1975, and her Ph. D. in 1984 at the Faculty of Technology, University of Zagreb. She spent sabbatical year 1973/74 in the USA as a Fulbright Fellow. 1967-1970 worked as Research Associate at the FTI, and 1970-1989 as Assistant at the Faculty of Food Technology and Biotechnology, University of Zagreb. In 1989 promoted to Scientific Associate, 1990 to Assistant Professor, 1996 to Associate Professor and 2000 to Full Professor at 3 undergraduate collegia at the Faculty of Food Technology and Biotechnology, University of Zagreb. She holds 2 and co-holds 1 collegia at the postgraduate study at the Faculty of Food Technology and Biotechnology, University of Zagreb. She was mentor of 11 papers awarded by the Rector's Award as well as 49 university diplomas, 2 MScs and 1 PhD. Worked on 8 scientific projects as co-investigator, principal investigator on 1 scientific and 1 expert project. Published 44 scientific and 2 expert papers and 4 chapters in books. Author of 1 and co-author of 2 intern scripts and 1 textbook. Participated at 21 international and 17 national meetings. Member of CBS, CSB, CMS and the international association EEMS.

List of relevant titles published within the last five years:

No.	Title
1.	S.Malzogu, I.Sušnik, J.Vorkapić-Furač**,** V.Rapić, V.Kovač: "Synthesis of some 2*H*-pyrone and ferrocene containing heterocyclic systems" *Heterocyclic Communications* **6** (2000)
2.	M.Jukić, A.Hergold-Brundić, M.Cetina, A.Nagl, J.Vorkapić-Furač: "The synthesis and structures of the novel pyridoxal oxime derivatives" *Structural Chemistry* **14** (6) (2003) 597-604.
3.	K.Berković, S. Kovač, J.Vorkapić-Furač: "Natural compounds as environmentally friendly corrosion inhibitors of aluminium." *Acta Alimentaria*. **33** (2004) 237-247.
4.	K. Berković, S.Kovač, J.Vorkapić-Furač: "The effect of rutin on the aluminium corrosion process" *Proceedings of Euro Food Chem XI Meeting*, Biologically-active phytochemicals in food (analysis, metabolism, bioavailability and function), Norwich 2001, FECS special publication No 269 (2001) 541-544.
5.	K.Delonga, Z.Šmit, V.Dragović-Uzelac, V.Mrkić, J.Vorkapić-Furač: "Hydrolysis Products of glucosinolates from white cabbage (*Brassica oleracea* L. var. *capitata*) and cauliflower (*Brassica oleracea* L. var.*botrytis*) analyzed by HPLC and GC/MS" *Proceedings of Euro Food Chem XI Meeting*, Biologically-active phytochemicals in food (analysis, metabolism, bioavailability and function), Norwich 2001, FECS special publication No 269 (2001) 213-217.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Z. Kniewald i sur., Priručnik za pripravu i izolaciju biološki djelatnih supstancija, (sveuč. priručnik), Alfej d.o.o., Zagreb, 2000.
2.	J.Vorkapić-Furač: Vitamini (poglavlje), *Tehnička enciklopedija* (1997) 13, 478-488, Leksikografski zavod "Miroslav Krleža", Zagreb
3.	J.Vorkapić-Furač: Nomenklatura iz područja vitamina i hormona: Nomenklatura vitamina D. Nomenklatura retinoida. Nomenklatura peptidnih hormona, *Kem. ind*. **38** (1989) B1-B15.
4.	D.Milatović, J.Vorkapić-Furač, M. Škrinjarić-Špoljar, E.Reiner: " Synthesis of three Pyridoxal Oxime Derivatives and their Reactivating Potency against Phosphylated Acetylcholinesterase" *Acta Pharm. Yugosl.* **39** (1989) 281.
5.	Fifteen graduation thesis

I. BASIC DATA ON PROPOSED MODULE

Name of module: **BIOTECHNOLOGICAL ASPECTS OF WINE PRODUCTION**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): **3/V**

Module status: Ground, ElectiveA, Elective B **Elective A**

Language: English

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Professor	Srđan	Novak
Scientific-educational title	name	surname

Number of ECTS points **4**

Total number of contact hours: **48**

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	**24**
	Auditory Practice	
	Laboratory Practice	
	Practicum	**24**
	Seminar	
	Field Work	

Requirements for signature to be appended

Regular attendance of lectures and exercises

Manner in which examination is taken: Written [X] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Wine - traditional biotechnological product. Wine classification. Grapes as a raw material. Phases of different wine types production. Organization and equipment of wine cellars. Equipment for winemaking. Role of sulphur and its use in wine production. Microorganisms in wine production. Spontaneous and inoculated fermentations. Enological characteristics, selection criteria, identification methods and industrial production of wine yeast starter cultures. Crushing, destemming, pressing, settling, maceration. Alkoholic fermentation in wine production – conditions, progression, kinetics. Metabolism of sugar, nitrogen compounds and organic acids. Influence of yeast metabolism on wine composition (fermentation aroma). Malolactic fermentation - influence on wine, selection and commercial production of starter cultures. Racking, maturation, clarification / filtration, stabilization, blending (egalisage and coupage) Bottling. Specific wine styles. Storing wine. Yeast autolysis in enology. Wine spoilage and faults. Wine quality (chemical, instrumental, microbiological and sensory analysis). Enzymes in wine production and quality control. Modern trends in wine production. Utilization of wine industry byproducts.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Learning theoretical knowledge and practical skils on biotechnological aspects of wine production, wich make students able for autonomous work in wine cellar and quality control.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	Licul, R.; Premužić, D. Praktično vinarstvo i podrumarstvo. Nakladni zavod Znanje, Zagreb, 1977.
2.	Zoričić, M. Podrumarstvo, Nakladni zavod Globus, Zagreb, 1996.
3.	Wine Microbiology and Biotechnology, G.H. Fleet (Ed.), Harwood Publishers, Chur, Switzerland 1993
4.	
5.	

Recommended literature

No.	Title
1.	Dittrich, H.H. Wine and brandy. In: Rehm, H.J., Reed G., Pűhler, A., Stadler, P., Vol. 9 (Reed G., Nagodawithana T.W., eds, Biotechnology, Vol. Enzymes, Biomass, Food and Feed), VCH, Weinheim, (1995) pp. 464-503.
2.	Boulton, R.B.; Singleton, V.L.; Bisson, L.F.; Kunkee, R.E. Principles and practices of winemaking. Chapman & Hall, International Thomson Publishing, New York 1996
3.	Mirošević, N. Vinogradarstvo. Nakladni zavod Globus, Zagreb 1996
4.	Fugelsang, K.C. Wine microbiology, Chapman & Hall, New York 1997.
5.	Delfini C., Formica, J.V. Wine microbiology: science and technology. Marcel Dekker, Inc. New York 2001.

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full Professor	Novak	Srđan
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:

E-mail address: srnovak@pbf.hr

Address of personal web page:

Date of last review:

CV (no more than 1200 characters): I was born on Janury 3rd 1952. I graduated biotechnology studies on the Faculty of Technology, University of Zagreb in 1976. I have been working on the Faculty of Food Technology and Biotechnology, University of Zagreb since 1977 where I completed Master Thesis in 1984. and Ph.D. Thesis in 1992. I spent 15 months at the California Institute of Technology, Pasadena, California, USA and 10 months at Labatt Institute, London, Ontario, Canada. The area of my scientific interests cover biochemical engineering and microbial physiology. I attanded many scientific congresses with approximately 50 communications and I have published 28 scientific publications (16 of them are indexed in SCI). Professionally I worked on different biotechnological processes and procedures (beer production, organic acids, antibiotics, food products, waste water treatment and tretment of waste management). I am member of Croatian Academy of Engineering, Croatian Society of Biotechnology (4 years as the president, 9 years as the member of Executive Board) and some other societies. I am the member of the editorial board of few scientific journals. I am full professor since 2004.

List of relevant titles published within the last five years:

1.	M. Ivančić, B. Šantek, S. Novak, and V. Marić, Fermentative bioconversion in a horizontal rotating tubular bioreactor. Proc. Biochem. 39 (8); 995 - 1000; 2004.
2.	M. Ivančić, B. Šantek, S. Novak, P. Horvat and V. Marić, Bioprocess kinetics in a horizontal rotating tubular bioreactor. Bioprocess Biosyst. Eng. 26; 169 - 175; 2004.
3.	A. Slavica, B. Šantek, S. Novak and V. Marić, Microbial acetate oxidation in horizontal rotating tubular bioreactor. J. Biosci. 29; 169 - 177; 2004
4.	B. Šantek, P. Horvat, S. Novak, V. Marić, Kriteriji povećanja obujma bioreaktora, Kem. Ind., 53 (1); 7 - 24; 2004.
5.	S. Novak, *V. Zechner-Krpan*, V. Maric'. Regulation of maltose transport and metabolism in *Saccharomyces cerevisiae*. Food Technol. Biotechnol 42 (3), 213-218, 2004.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Petravić Tominac, V.; Blagojević, K.; Novak, S.; Zechner-Krpan, V.; Marić, V. (2005) Fermentative properties of some *Saccharomyces cerevisiae* wine yeasts isolated from Istria region. Periodicum biologorum in press.
2.	Petravić Tominac, V.; Eke, H.; Šehović, Đ.; Zechner-Krpan, V.; Novak, S.; Marić, V. (2005) Fermentation of Graševina must with different strains of wine yeasts. Periodicum biologorum in press.
3.	S. Novak, T. D'Amore, I. Russell and G. G. Stewart, Characterization of sugar transport in 2-deoxy-D-glucose resistant mutants of yeast. J. Ind. Microbiol. 6; 149-155, 1990.
4.	S. Novak and V. Marić, Utjecaj glukoze na energetski metabolizam kvasca – represija glukozom i katabolička inaktivacija. Preh. Bioteh. Rev. 31; 35-42, 1993.
5.	S. Novak and V. Marić, Transport i regulacija metabolizma ugljikohidrata kod kvasca *Saccharomyces cerevisiae:* I. Glukoza, fruktoza i manoza. Kem. Ind. 44; 341-353, 1995

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Assistant professor	Vesna	Zechner-Krpan
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed:

E-mail address: vzkrpan@pbf.hr

Address of personal web page:

Date of last review: 12. 5. 1998.

CV (no more than 1200 characters):

Born on March 31th, 1965., married, mother of two children. She finished her primary and secondary education in Zagreb with excellent marks. On the Faculty of Food Technology and Biotechnology, Zagreb she made her diploma work, master and doctoral theses. She is working since 1988. on the Faculty of Food Technology and Biotechnology, Department of Biochemical Engineering (young assistant; 1988-1992.; assistant 1992-1995.; assistant professor 1998-) Specialisation at United States Department of Agriculture, Maryland, USA (3 months in 1990.) and at Department of Biological Sciences, University Auckland, New Zealand (3 months in 1996). She attanded in 1998. Bioprocess Engineering Course, in Supetar, on island Brač and in 2004. Liquid Chromatography Course, PLIVA, Zagreb. She is member of Croatian Society of Microbiology, Croatian Biochemical Society and European Federation of Biotechnology. She is also a member and treasurer of Croatian Society of Biotechnology (from 1996-2000., 2002-2004., 2004-). As author and co-author she published 8 scientific and 4 professional papers and attanded 12 congresses with presentations. She co-worked on 10 scientific projects and leaded one joint project. Nowadays she is leading and is main scientist on technological project granted by Ministry of Science and Technology of RH (2002-). Speaks, writes and reads English and German languages.

List of relevant titles published within the last five years:

No.	Title
1.	S. Novak, **V. Zechner-Krpan**, P. Raspor, V. Marić. Transport ugljikohidrata i regulacija metabolizma ugljikohidrata u kvasca *Saccharomyces cerevisiae* Kem. Ind. 49, 433-441, 2000.
2.	**V. Zechner-Krpan**, V. Marić. Microbes and functional foods. In: Current Studies of Biotechnology, Vol III, Food, 121-131, 2003
3.	S. Novak, **V. Zechner-Krpan**, V. Marić. Regulation of maltose transport and metabolism in *Saccharomyces cerevisiae.* Food Technol. Biotechnol 42 (3), 213-218, 2004.
4.	V. Petravić Tominac, K. Blagojević, S. Novak, **V. Zechner-Krpan**, V. Marić. Fermentative properties of some *Saccharomyces cerevisiae* wine yeasts. Periodicum Biologorum 107, 2005.
5.	V. Petravić Tominac, H. Eke, Đ. Šehović, **V. Zechner-Krpan**, S. Novak, V. Marić. Fermentation of Graševina must with different strains of wine yeast. Periodicum Biologorum 107, 2005.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	S. Novak, **V. Zechner-Krpan**, P. Raspor, V. Marić. Transport ugljikohidrata i regulacija metabolizma ugljikohidrata u kvasca *Saccharomyces cerevisiae* Kem. Ind. 49, 433-441, 2000.
2.	V. Marić, **V. Zechner-Krpan**. Microbial technology and functional foods. Functional Foods, 21st Food Technology Days 2001, str. 181 - 193, November, 8 – 9, 2001. Portorož, Slovenia.
3.	**V. Zechner-Krpan**, V. Marić. Microbes and functional foods. In: Current Studies of Biotechnology, Vol III, Food, 121-131, 2003
4.	S. Novak, **V. Zechner-Krpan**, V. Marić. Regulation of maltose transport and metabolism in *Saccharomyces cerevisiae.* Food Technol. Biotechnol 42 (3), 213-218, 2004.
5.	V. Petravić Tominac, K. Blagojević, S. Novak, **V. Zechner-Krpan**, V. Marić. Fermentative properties of some *Saccharomyces cerevisiae* wine yeasts. Periodicum Biologorum 107, 2005.

Elective modules B:

I. BASIC DATA ON PROPOSED MODULE

Name of module: MODELING AND CHEMOMETRICS IN FOOD ENGINEERING

Core course of studies for module: FOOD ENGINEERING

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [x] Append X in the appropriate box

Academic year in which module appears (semester): 2(4)

Module status: Ground, ElectiveA, Elective B Elec B

Language: English
Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Prof. dr.sc.	Želimir	Kurtanjek
Scientific-educational title	name	surname

Number of ECTS points 3
Total number of contact hours: 40

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	25
	Auditory Practice	
	Laboratory Practice	
	Practicum	10
	Seminar	5
	Field Work	

Requirements for signature to be appended
completed laboratory and seminar reports

Manner in which examination is taken: Written [x] Oral [x] Append X in the appropriate box

Description of module (in no more than 1200 characters):
Systems view of technological processes modelling. Balances of mass, energy and momentum for examples in food processing. Mathematical models of physical and chemical properties of food stuffs. Basics of mathematical and chemometric analysis of spectral data of food (NIR, IR, VIS). Basics of chemometric methods and related software support. Pattern recognition and food sample classification in the space of principal components. Application of principal component regression models for process control. Estimation of state space by determination of latent variables. Modelling based on partial least square method PLS. Algorithms for quality monitoring based on scores in principal component subspace. Modelling of nonlinearities in principal component space. Process control and chemometrics.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Objective is to enable knowledge integration on processes with mathematical and chemometric models.

Literature (list should include details on publisher and year of publication):
Compulsory literature

1.	R.G. Brereton: Chemometrics: Data Analysis for the Laboratory and Chemical Plant, John Wiley, 2003.
2.	Richard Kramer: Chemometric Techniques for Quantitative Analysis, Marcel Dekker, 1998.
3.	K.R. Beebe, R.J. Pell, Mary Beth Seasholtz: Chemometrics : A Practical Guide, Wiley-Interscience, 1998.
4.	

Recommended literature

No.	Title
1.	
2.	
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Prof. dr.sc.	Želimir	Kurtanjek
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Faculty of Food Technology and Biotechnology

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [x] instructor [x] Append X in the appropriate box

Title of curriculum module executed:	Modelling and chemometric in food engineering
E-mail address:	zkurt@pbf.hr
Address of personal web page:	www.pbf.hr/~zkurt
Date of last review:	1.12. 2004
CV (no more than 1200 characters):	Želimir Kurtanjek was born in 1946 in Zagreb, Croatia. In 1971 he graduated with the engineering degree in physics from the University of Zagreb. After graduation has was employed at the Faculty of Technology, Department in Sisak, University of Zagreb. In 1975 he enrolled at the postgraduate study at the Department of Chemical Engineering, The University of Houston, TX, USA. In 1979 he received his Ph.D. degree in chemical engineering. In 1980. he was employed at the Faculty of Food Technology and Biotechnology, University of Zagreb. He completed his postdoctoral studies at the Department of Chemical Engineering, University of Gent, Belgium. Through the EU project TEMPUS during 1991. he was a visiting professor at the Department of Biological Sciences, University of Ulster, Coleraine, Northern Ireland. Presently he is employed at Faculty of Food Technology and Biotechnology, University of Zagreb as a professor of chemical engineering and is teaching reactor engineering, mathematical modelling and process control to students of biotechnology. In his scientific work he is interested in modelling and control of reactors, modelling of bioprocesses and food engineering, and application of AI methods in process control. He is a member of international editorial boards of Chemical and Biochemical Engineering Quarterly, and Food Technology and Biotechnology journals.

List of relevant titles published within the last five years:
Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

1.	N. Pavicic, T. Jemric, Z. Kurtanjek, T. Cosic, I. Pavlovic, D. Blaskovic "Relationship between water-soluble Ca and other elements and their bitter pi occurance in "Iderad" apples: a multivariate approach, Ann. appl. Biol. 145, 193-196 (2004).
2.	D. Bičanić, C. Neamtu, M. Manojlović, D. Linden, D. Dadarlat, K. Posavec, A. Gijsbersten, Ž. Kurtanjek, "Tomato pastes and their moisture content as determined via the measurements of thermal effusivity by means of infrared photothermal radiometry and inverse photopyroelectric technique", Acta Chim. Slov. 51, 39-46, (2004)
3.	J. Gajdoš, Ž. Kurtanjek, "Neizrazito modeliranje i optimiranje u planiranju prehrane", Kem. Ind., 52 (5) 195-200 (2003)
4.	D. Kovačević, D. Šubašić, Ž. Kurtanje, "Effect of polydextrose and NaCl on initial freezing point of chicken, egg and surimi", Italian Food Science, 15 (1) 105-113, 2003.
5.	Magdić D., Horvat D., Jurković Z., Sudar R., Kurtanjek Ž., "Chemometric Analysis of High Molecular Weight Glutenin Proportions and Image Data of Bread Crumb Structure from Croatian Wheat Cultivars", Food Technol.Biotechnol., 40 (4) 331-341 (2002)

1.	Ž. Kurtanjek, "Mjerenje i vođenje procesa", Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (author of a text book)
2.	Ž. Kurtanjek, "Reaktorsko inženjerstvo", Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (author of a text book)
3.	Ž. Kurtanjek, "Modeliranje i vođenje procesa", Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (author of a text book)
4.	J. Gajdoš, "Primjena neizrazitog modeliranja i optimiranja u planiranju društvene prehrane", Disertacija, Prehrambeno biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (mentor)
5.	D. Beluhan "Advanced bioprocess control by artificial intelligence algorithms: application in cultivation of yeast Saccharomyces cerevisiae", Disertacija, Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2000. (mentor)

I. BASIC DATA ON PROPOSED MODULE

Name of module: ROBOTICS IN FOOD ENGINEERING

Core course of studies for module: FOOD ENGINEERING

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [x] Append X in the appropriate box

Academic year in which module appears (semester): 2(4)

Module status: Ground, ElectiveA, Elective B: Elec B

Language: English

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Prof. dr.sc.	Želimir	Kurtanjek
Scientific-educational title	name	surname

Number of ECTS points: 3

Total number of contact hours: 40

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	20
	Auditory Practice	
	Laboratory Practice	
	Practicum	20
	Seminar	
	Field Work	

Requirements for signature to be appended

completed laboratory and seminar reports

Manner in which examination is taken: Written [x] Oral [x] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Introduction to robotics: basic definitions, classification, historical development, examples and application of robots. Present and future applications of robots in food industry. Specific demands in design of robots for food industry. Fundamentals of hardware and software of robots. Kinematic and dynamic models of robots. Planning and control of mobile robots. Intelligent systems for computer vision and tactile force. Robots with artificial intelligence. Cooperation of robots and man on production floor.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Gain of basic information on robot hardware and software and their integration into production in food industry.

Literature (list should include details on publisher and year of publication):
Compulsory literature

1.	John J. Craig: Introduction to Robotics: Mechanics and Control (3rd Edition), Prentice Hall, 2003.
2.	Emanuele Trucco, Alessandro Verri: Introductory Techniques for 3-D Computer Vision, Prentice Hall, 1998.
3.	Koorosh Khodabandehloo (Ed.): Robotics in Meat, Fish and Poultry Processing, Kluwer Academic Publishers, 1993.
4.	

Recommended literature

No.	Title
1.	
2.	
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION
Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Prof. dr.sc.	Želimir	Kurtanjek
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Faculty of Food Technology and Biotechnology

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [x] instructor [x] Append X in the appropriate box

Title of curriculum module executed:	Modelling and chemometric in food engineering
E-mail address:	zkurt@pbf.hr
Address of personal web page:	www.pbf.hr/~zkurt
Date of last review:	1.12. 2004
CV (no more than 1200 characters):	Želimir Kurtanjek was born in 1946 in Zagreb, Croatia. In 1971 he graduated with the engineering degree in physics from the University of Zagreb. After graduation has was employed at the Faculty of Technology, Department in Sisak, University of Zagreb. In 1975 he enrolled at the postgraduate study at the Department of Chemical Engineering, The University of Houston, TX, USA. In 1979 he received his Ph.D. degree in chemical engineering. In 1980. he was employed at the Faculty of Food Technology and Biotechnology, University of Zagreb. He completed his postdoctoral studies at the Department of Chemical Engineering, University of Gent, Belgium. Through the EU project TEMPUS during 1991. he was a visiting professor at the Department of Biological Sciences, University of Ulster, Coleraine, Northern Ireland. Presently he is employed at Faculty of Food Technology and Biotechnology, University of Zagreb as a professor of chemical engineering and is teaching reactor engineering, mathematical modelling and process control to students of biotechnology. In his scientific work he is interested in modelling and control of reactors, modelling of bioprocesses and food engineering, and application of AI methods in process control. He is a member of international editorial boards of Chemical and Biochemical Engineering Quarterly, and Food Technology and Biotechnology journals.

List of relevant titles published within the last five years:
Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

1.	N. Pavicic, T. Jemric, Z. Kurtanjek, T. Cosic, I. Pavlovic, D. Blaskovic "Relationship between water-soluble Ca and other elements and their bitter pi occurance in "Iderad" apples: a multivariate approach, Ann. appl. Biol. 145, 193-196 (2004).
2.	D. Bičanić, C. Neamtu, M. Manojlović, D. Linden, D. Dadarlat, K. Posavec, A. Gijsbersten, Ž. Kurtanjek, "Tomato pastes and their moisture content as determined via the measurements of thermal effusivity by means of infrared photothermal radiometry and inverse photopyroelectric technique", Acta Chim. Slov. 51, 39-46, (2004)
3.	J. Gajdoš, Ž. Kurtanjek, "Neizrazito modeliranje i optimiranje u planiranju prehrane", Kem. Ind., 52 (5) 195-200 (2003)
4.	D. Kovačević, D. Šubašić, Ž. Kurtanje, "Effect of polydextrose and NaCl on initial freezing point of chicken, egg and surimi", Italian Food Science, 15 (1) 105-113, 2003.
5.	Magdić D., Horvat D., Jurković Z., Sudar R., Kurtanjek Ž., "Chemometric Analysis of High Molecular Weight Glutenin Proportions and Image Data of Bread Crumb Structure from Croatian Wheat Cultivars", Food Technol.Biotechnol., 40 (4) 331-341 (2002)

1.	Ž. Kurtanjek, "Mjerenje i vođenje procesa", Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (author of a text book)
2.	Ž. Kurtanjek, "Reaktorsko inženjerstvo", Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (author of a text book)
3.	Ž. Kurtanjek, "Modeliranje i vođenje procesa", Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (author of a text book)
4.	J. Gajdoš, "Primjena neizrazitog modeliranja i optimiranja u planiranju društvene prehrane", Disertacija, Prehrambeno biotehnološki fakultet, Sveučilište u Zagrebu, 2002. (mentor)
5.	D. Beluhan "Advanced bioprocess control by artificial intelligence algorithms: application in cultivation of yeast Saccharomyces cerevisiae", Disertacija, Prehrambeno-biotehnološki fakultet, Sveučilište u Zagrebu, 2000. (mentor)

Curriculum course (subject) instructor:

Prof. dr.sc.	Ivan	Petrović
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Faculty of Electrical Engineering and Computer Science

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [x] Append X in the appropriate box

Title of curriculum module executed: Robotics in food engineering
E-mail address: ivan.petrovic@fer.hr
Address of personal web page:
Date of last review: 2000

CV (no more than 1200 characters): Ivan Petrović was born in 1961 in Klobuk, Ljubuški, Bosnia and Hercegovina. In 1971 he enrolled at the Faculty of Electrical engineering in Zagreb where he graduated in 1983. In the same department ha received academic titles of Master of science (1989) and Doctor of science (1998). Since 1994 he is employed, firstly as an assistant, and from 2000 as associate professor of Automatic Process Control. Together with Prof. N. Perić and Siemens they organized a Practicum on programmable techniques for continuous education for industry needs. His scientific interests are in various aspects of theory of process control and its application. He is author or cooauthor of 11 papers published in scientific journals. On ISCS/IFAC Symposium on Neural Computing he was a recepient of Best Presentation Awards (Wien, 1998.). Results of his research have found numerous applications in industry, such as in steel industry Zenica and electromotor industry Končar. For the last years his interes is focused on development of advanced strategies for estimations and control of complex systems with applications in mobile robots.

List of relevant titles published within the last five years:
Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

red. broj	Naziv
1.	Ivanjko, E., Petrović, I.: Extended Kalman Filter based Mobile Robot Pose Tracking using Occupancy Grid Maps, Mediterranean Electrotechnical Conference – MELECON 2004, Dubrovnik, Croatia, 2004.
2.	Brezak, M., Petrović, I., Kitanov, A.: An Approach to Motion Planning of Mobile Robots Considering Dynamic Constraints, European Conference on Power Electronics and Motion Control – EPE-PEMC 2004, Riga, Latvia, 2004.
3.	Kezić, D., Perić, N., Petrović, I.: Deadlock Prevention in Manufacturing Systems Based on Petri Nets, European Conference on Power Electronics and Motion Control: EPE-PEMC 2004, Riga, Latvia, 2004.
4.	Banjanović-Mehmedović, L., Petrović, I., Ivanjko, E.: Hough Transform based Correction of Mobile Robot Orientation, CD ROM Proceedings of IEEE International Conference on Industrial Technology – ICIT'04, Hammamet, Tunis, 2004.
5.	Petrović, Ivan: Od industrijskih do uslužnih robota, AUTOMATIKA - časopis za automatiku, mjerenje, elektroniku, računarstvo i komunikacije, 3-4/2003; pp. 205-210, Zagreb, 2003

1.	Ivanjko, E., Petrović, I., Maček, K.: Improvements of Occupancy Grid Maps by Sonar Data Corrections, CD-ROM Proceedings of FIRA Robot World Congress 2003, Vienna, Ausrtija, 2003.
2.	Maček, K., Petrović, I., Ivanjko, E.: An approach to motion planning of indoor mobile robots, Proceedings of IEEE International Conference on Industrial Technology – ICIT'03, pp. 969-973, Maribor, Slovenija, December 10-12, 2003.
3.	Maček, K., Petrović, I., Perić, N.: A reinforcement learning approach to obstacle avoidance of mobile robots, Proceedings of the 7th IEEE International Workshop on Advanced Motion Control – ACM 2002, pp. 462-466, Maribor, Slovenia, July 3-5, 2002.

I. BASIC DATA ON PROPOSED MODULE

Name of module: APPLIED CHEMOMETRICS

Core course of studies for module: BIOTECHNOLOGY
BIOPROCESS ENGINEERING
FOOD ENGINEERING
FOOD QUALITY MENAGEMENT

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): 1., 2.

Module status: Ground, ElectiveA, Elective B: Elective B

Language: english
Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full prof.	Božidar	Grabarić
Scientific-educational title	name	surname

Number of ECTS points: 3
Total number of contact hours: 33

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	24
	Auditory Practice	
	Laboratory Practice	
	Practicum	
	Seminar	9
	Field Work	

Requirements for signature to be appended

The requirements for signature certification are taking part in the course and seminars.

Manner in which examination is taken: Written [X] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

The course gives the students fundamentals of chemometrics, including properties of signals in chemical analysis, analog and digital filtering, mathematical methods of filtering, deconvolution and Fourier transformation, univariate and multivariate calibration, factor analysis, principal component regression, simplex method and optimization methods, pattern recognition, and neural networks. The teaching is organized as classroom lectures and seminars where students are encouraged to individually solve problems from chemical, biochemical and engineering practice by the use of chemometric methods.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

The course aims to develop in students the skills necessary for application of chemometric techniques in solving problems from experimental and engineering practice.

Literature (list should include details on publisher and year of publication):
Compulsory literature

No.	Title
1.	M. Meloun, J. Militky, M. Forina: Chemometrics for analytical chemistry, Vol. 1, Ellis Horwood, Chichester, 1992.
2.	M. Meloun, J. Militky, M. Forina: Chemometrics for analytical chemistry, Vol. 2, Ellis Horwood, Chichester, 1994.
3.	

Recommended literature

No.	Title
1.	H. Martens, T. Naes: Multivariable calibration, John Wiley, Chichester, 1989.
2.	M.J. Adams: Chemometrics in analitical spectroscopy, The Royal Society of Chemistry, Cambridge, 1995.
3.	R. Cela: Avances en quimiometria practica, Universidade de Santiago de Compostela, 1994.
4.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Curriculum course (subject) instructor:

Full prof.	Božidar	Grabarić
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Chemistry and Biochemistry, Faculty of Food Technology and Biotechnology, University of Zagreb

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: Applied chemometrics

E-mail address: grabaric@pbf.hr

Address of personal web page:

Date of last review: July 7, 1998

CV (no more than 1200 characters):

Božidar S. Grabarić was born in Zagreb, Croatia in 1942. He received his Ph.D. in chemistry in 1973 from the Faculty of Technology, University of Zagreb, Croatia. From 1975 to 1977 he was on postdoctoral fellowship at the University of Melbourne (Australia), in 1979 at the Northwestern University (USA), in 1988 at the Las Cruces University (New Mexico, USA), and from 1993 to 1998 he was visiting professor at the Universitat de Barcelona (Spain). Now he is full professor and head of the Laboratory of General and Inorganic Chemistry and Electroanalysis at the Faculty of Food Technology and Biotechnology, University of Zagreb. He is a Deputy editor of Food Technology and Biotechnology. His research interests include electrochemical and spectroscopic methods for investigation of coordination equilibria in aqueous solutions, development and application of chemical sensors and biosensors, methods of selective molecular recognition, and chemometry.

List of relevant titles published within the last five years:

No.	Title
1.	Ivekovic D. Milardovic S. Grabaric BS. Palladium hexacyanoferrate hydrogel as a novel and simple enzyme immobilization matrix for amperometric biosensors. Biosensors & Bioelectronics. 20(4):872-878, 2004
2.	Sak-Bosnar M. Grabaric Z. Grabaric BS. Surfactant sensors in biotechnology part 1 - Electrochemical sensors [Review] Food Technology & Biotechnology. 42(3):197-206, 2004
3.	Sak-Bosnar M. Grabaric Z. Grabaric BS. Surfactant sensors in biotechnology part 2 - Non-electrochemical sensors [Review] Food Technology & Biotechnology. 42(3):207-212, 2004
4.	Matesic-Puac R. Sak-Bosnar M. Bilic M. Grabaric BS. New ion-pair based all-solid-state surfactant sensitive sensor for potentiometric determination of cationic surfactants. Electroanalysis. 16(10):843-851, 2004
5.	Rumenjak V. Milardovic S. Kruhak I. Grabaric BS. The study of some possible measurement errors in clinical blood electrolyte potentiometric (ISE) analysers. Clinica Chimica Acta. 335(1-2):75-81, 2003

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	J.-M. Díaz-Cruz, R. Tauler, B.S. Grabarić, M. Esteban and E. Casassas: Application of Multivariate Curve Resolution to Voltammetric Data. Part 1. Study of Zn(II) Complexation with Some Polyelectrolytes, J. Electroanal. Chem., 393 (1995) 7-16.
2.	M. S. Diaz-Cruz, B. S. Grabarić, Z. Grabarić, M. Esteban and E. Casassas: Optimisation of Resolution Function in Signals Ratio Method and Deconvolution by Polynomial Division - Quantitation of Cd(II) and In(III) from their Global Signals Obtained at Carbon Fibre Disk Ultramicroelectrode, Anal. Chim. Acta, 382 (1999) 105-115.
3.	M. Torres, J.-M. Díaz-Cruz, C. Ariño, B.S. Grabarić, R. Tauler and M. Esteban: Multivariate Curve Resolution Analysis of Voltammetric Data Obtained at Different Time Windows: Study of the System Cd^{2+} - Nitrilotriacetic Acid, Anal. Chim Acta, 371 (1998) 23-37.
4.	B.S. Grabarić, Z. Grabarić, R. Tauler, M. Esteban and E. Casassas: Application of Multivariate Curve Resolution to the Voltammetric Data. Part 3. Factor Analysis Ambiguities in the Study of Weak Consecutive Complexation of Metal Ion with Ligand, Anal. Chim. Acta, 341 (1997) 105-120.
5.	B. S. Grabarić, Z. Grabarić, M. Esteban and E. Casassas: Evolving Polynomial Regression and Error Analysis in Model Identification and Determination of Consecutive Stability Constants Using Voltammetric Methods, Anal. Chim. Acta, 325 (1996) 135-149.

Curriculum course (subject) instructor:

Full prof.	Zorana	Grabarić
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Chemistry and Biochemistry, Faculty of Food Technology and Biotechnology, University of Zagreb

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Applied chemometrics

E-mail address: zoranag@pbf.hr

Address of personal web page:

Date of last review: January 8, 2001

CV (no more than 1200 characters):

Zorana Grabarić was born in Zagreb, Croatia in 1942. She received her Ph.D. in chemistry in 1990 from the Faculty of Technology, University of Zagreb, Croatia. From 1975 to 1977 she was visiting scientist at the University of Melbourne (Australia), and from 1993 to 1997 at the Universitat de Barcelona (Spain). Now she is full professor in the Laboratory of General and Inorganic Chemistry and Electroanalysis at the Faculty of Food Technology and Biotechnology, University of Zagreb. Her research interests include spectroscopic methods for investigation of coordination equilibria in aqueous solutions, development and application of chemical sensors and biosensors in clinical chemistry and food analysis, mathematical methods for signal resolution, and interactions of heavy metals with biomolecules.

List of relevant titles published within the last five years:

No.	Title
1.	Sak-Bosnar M. Grabaric Z. Grabaric BS. Surfactant sensors in biotechnology part 1 - Electrochemical sensors [Review] Food Technology & Biotechnology. 42(3):197-206, 2004
2.	Sak-Bosnar M. Grabaric Z. Grabaric BS. Surfactant sensors in biotechnology part 2 - Non-electrochemical sensors [Review] Food Technology & Biotechnology. 42(3):207-212, 2004
3.	Milardovic S. Grabaric Z. Rumenjak V. Blau N. Milosevic D. Use of a ruthenium(III), iron(II), and nickel(II) hexacyanometallate-modified graphite electrode with immobilized oxalate oxidase for the determination of urinary oxalate. Journal of AOAC International. 84(6):1927-1933, 2001
4.	Milardovic S. Grabaric Z. Grabaric BS. Sensitive amperometric oxalate biosensor for food analysis. Food Technology & Biotechnology. 38(3):203-210, 2000
5.	Milardovic S. Grabaric Z. Tkalcec M. Rumenjak V. Determination of oxalate in urine, using an amperometric biosensor with oxalate oxidase immobilized on the surface of a chromium hexacyanoferrate-modified graphite electrode. Journal of AOAC International. 83(5):1212-1217, 2000

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Z. Grabarić, D. Iveković, L. Sipos and B.S. Grabarić: "Improved Signals Ratio Resolution Method by Optimisation of Resolution Function - Simultaneous Determination of Cu(II) and Cd(II) in Water Samples" , J. AOAC Intern., 82 (5) (1999) 1185-1196.
2.	S. Diaz-Cruz, Z.Grabarić, B. S. Grabarić, M. Esteban and E. Casassas: "Optimisation of Resolution Function in Signals Ratio Method and Deconvolution by Polynomial Division-Quantitation of Cd(II) and In(II) from their Global Signals Obtained at Carbon Fibre Disk Ultramicroelectrode", Anal. Chim. Acta, 382 (1999) 105-115.
3.	B. S. Grabarić, Z. Grabarić, J. M. Diaz-Cruz, M. Esteban and E. Casassas: "Metal Complexation Model Identification and the Detection and Elimination of Erroneus Points Using Evolving Least-Squares Fitting of Voltammetric Data", Anal. Chim. Acta, 363 (1998) 261-278.
4.	B. S. Grabarić, Z. Grabarić, M. Esteban and E. Casassas: "Resolution of Global Signals Using Ratio Differential Pulse Polarograms: Determination of p-Nitroanaline and p-Nitrotoluene in their Mixture", J. Electroanal. Chem., 420 (1997) 227-234.
5.	Z.Grabarić, B. S. Grabarić, M. Esteban and E. Casassas: "Determination of Small Amounts of Analytes in the Presence of Large Excess of One Analyte From Multi-Analyte Global Signals of Differential PulseVoltammetry and Related Techniques With the Signal Ratio Resolution Method", Analyst, 121 (1996) 1845-1850.

I. BASIC DATA ON PROPOSED MODULE

Name of module: SENSORY AND CHEMICAL EVALUATION OF WINE

Core course of studies for module: Graduated study, Food engineering

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): 2 (III)

Module status: Ground, Elective A, Elective B: Elective B

Language: Croatian and English language
Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Ph. D.	Mara	Banović
Scientific-educational title	name	surname

Number of ECTS points: 3
Total number of contact hours: 35

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	20
	Auditory Practice	
	Laboratory Practice	15
	Practicum	
	Seminar	
	Field Work	

Requirements for signature to be appended

Take a part in 80% of lectures and finished laboratory practices.

Manner in which examination is taken: Written [X] Oral [ ] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Introduction in sensory analysis. Sensory characteristics of wine. Type of wine. Sensory evaluation methods. Aroma of wine. Chemical analysis of wine. Spectrophotometrics methods for wine analysis. Instrumental analysis of wine (GC, HPLC, AAS).

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Students, especially those attended a course abuot winemaking, will be learn about parameters significant in evaluation of wine quality, and they will learn about methods of sensory and chemical analusis of wine.

Literature (list should include details on publisher and year of publication):
Compulsory literature

No.	Title
1.	Mimeographed course materials (in preparation)
2.	
3.	
4.	
5.	

Recommended literature

No.	Title
1.	Ough, C., S., Amerine, M. A. (1988) Methods for Analysis of Musts and Wines, John Wiley & Sons, New York.
2.	Zoecklein, B. W., Fugelsang, K. C., Gump, B. H., Nury, F. S. (1995) Wine analysis and production, Chapman & Hall, New York.
3.	Jackson, R. S. (2002) Wine Tasting: A professional Handbook, Academic Press, London

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION
Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Assistant professor	Mara	Banović
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor	Faculty of food technology and biotechnology Department of food technology engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:	SENSORY AND CHEMICAL EVALUATION OF WINE
E-mail address:	mbanovic@pbf
Address of personal web page:	
Date of last review:	March 28. 2003.
CV (no more than 1200 characters):	Dr. sc. Mara Banović assistant professor was born 1959. in Benkovac. She graduated at Faculty of Food Technology and Biotechnology 1983. where she got a job at 1984. Postgraduate study of Food technology she finished at the same faculty, and shi won master degree 1988. with thesis named "Stability of sauces, soups and purees preserved by freezing in pelletised form". After that she had her Ph. D. thesis named "Removal of heavy metals using polymer as alternative to blue fining" she won in 1996. Her education and investigations belong in area of Biotechnological science, field Food technology, branch Engineering. Her first job was in Laboratory of development and preparation of fruits, vegetables and winemaking. After that she worked in Laboratory of food quality control and since April of 1999 she has been a head of Laboratory for technology and analytics of beverages. Her teaching activities include participation and leading student's exercises and lectures in field of food quality and winemaking on graduated and post graduated studies. She is co-worker on some scientific (2 international and 7 national) and professional (3) projects. She was mentor of few M.S. And one Ph.D. thesis. Her activities resulted with participation on international and domestic congresses, and she published 20 scientific and professional papers.

List of relevant titles published within the last five years:

No.	Title
1.	Kovačević Ganić, K., Gracin, L., Komes, D., Banović, M., Paić, S. (2001) Composition of Malvazija istarska wine aroma: Correlations between sensory and instrumental data. Proceedings from the 4th Croatian Congress of Food Technologists, Biotechnologists and Nutritionists, Opatija, Croatia, October 3-5, 2001, 425-429.
2.	Miličević, B., Banović, M., Kovačević Ganić, K., Gracin, L. (2002) Impact of grape varieties on wine distillates flavour. Food Technol. Biotechnol. 40 (3)221-225.
3.	Kovačević Ganić, K., Staver,M., Peršurić,Đ., Banović, M., Komes,D., Gracin, L. (2003) Influence of blending on the aroma of Malvasia istriana wine. Food. Technol. Biotechnol. 41(4) 111-119.
4.	Banović, M., Miličević,B., Kovačević Ganić, K., Komes,D. (2004) Characteristics of wine distillates produced in Kutjevo region, Croatia. Acta Alimentaria 34 (2)157-166.
5.	Komes, D., Lovrić, T., Kovačević Ganić, K., Gajdoš Kljusurić, J., Banović, M. (2005) Trehalose improves flavour retention in dehydrated apricot puree, Int. Journal of Food. Sci. and Technol. 40: 1-13.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Kovačević Ganić, K (2002) Promjena sastava i stabilnosti arome pri kupažiranju vina , Magistarski rad, mentor M.Banović
2.	Kovačević Ganić, K., Staver,M., Peršurić,Đ., Banović, M., Komes,D., Gracin, L. (2003) Influence of blending on the aroma of Malvasia istriana wine. Food. Technol. Biotechnol. 41(4) 111-119.
3.	Lukić, I. (2005) Određivanje hlapljivih spojeva u komovicama i drugim proizvodima destilacije od grožđa i vina ekstrakcijom na čvrstoj fazi (PMF), Magistarski rad, Mentor M.Banović
4.	Diploma papers (24) with subjacts from wine production
5.	Lecturer on courses " Chemistry and technology of wine and strong alcoholic drinks" and "Developments in wine technology"

I. BASIC DATA ON PROPOSED MODULE

Name of module: PRODUCTION AND USE OF BAKER AND FOOD YEAST

Core course of studies for module: FOOD INGEENERING

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): 2/III

Module status: Ground, ElectiveA, Elective B: B

Language: English
Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

associate professor	Vesna	Stehlik-Tomas
Scientific-educational title	name	surname

Number of ECTS points: 3
Total number of contact hours: 40

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	10
	Auditory Practice	
	Laboratory Practice	25
	Practicum	
	Seminar	5
	Field Work	

Requirements for signature to be appended
Attended lectures, laboratory practice and seminars mus be finished

Manner in which examination is taken: Written [ ] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):
Lectures (10 hours)
Types of yeast. Morphological and phisiological characteristc of yeast. Chemical composition and biochemistry of yeast biomass. Definition of baking yeast. Basic principles of yeast growth. Production in laboratory and industrie scale. Types of baker yeast. Utilization of baking yeast in baking processes (sweet dough, frozen dough). Characteristics of baker yeast. Composition of baker yeast. Yeasts in Food Industries. Production of food yeast from various raw materials (molasses, whey, ethanol, methanol, sulfite lye, starch raw material). Use of food yeast (baker products, cheese, meat products). Nutritional value of food yeast.
Laboratory Practice (25 houts)
Selecting and preparing of raw materials and yeasts for production of food yeast. Aerobic production of food and baker yeast. analyses of produced baker and food yeast (proteins, vitamins, microelements).
Seminars (5 hours)
Mathematical bilances for food and baker yeast in laboratory scale.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):
Students will be able to use their knowledge in most food industries. Knowledge acquired through completion of this course will contribute to enhance quality of bakers production.

Literature (list should include details on publisher and year of publication):
Compulsory literature

No.	Title
1.	Brian J. B. Wood (ed) (1998). Microbiology of fermented Foof. Blackie Academic Professional, London U.K.
2.	Halasz, A; Lasztity, R (1991). Use of Yeast Biomas in Food Production, CRC Pr, Portland, Or.
3.	
4.	
5.	

Recommended literature

No.	Title
1.	Stehlik-Tomas V (2005): Production and use of baking and food yeast (in preparation)
2.	
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION
Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

associate proffesor	Vesna	Vesna Stehlik-Tomas
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Faculty of Food Technology and Biotechnology, Department of food technology ingeenering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: Production and use of baker and food yeast
E-mail address:
Address of personal web page:
Date of last review:

CV (no more than 1200 characters):

Dr. sc. Vesna Stehlik-Tomas was born in Zagreb on January 25, 1947. She completed and graduated from high school in Zagreb in 1966. That year, she applied and was accepted to study in the Biotechnological Department of the Technological University in Zagreb (which later became the Faculty of Food Technology and Biotechnology) from which she graduated in 1974. She started working as a technician in the Laboratory of fermentation technology and biological treatment of the waste water. She defended Master thesis under the title «Biosynthesis of single cell proteins on the basis of yeast on whey» in 1983. She was selected as technical staff member in 1979 and have been working since 1989 as in the assistant. She completed Ph thesis in 1995 under the title «Preparation of mixed starter-cultures for bakery». Both academic degrees are in the area of biotechnical research, in the field of biotechnology and engineering branch. She was appointed in 1996 as assistant Professor and received asocciate Profesor tenure in 2000. She manage the technological project TP/0058-05 and she is a Team member of research project 0058022. She has published 20 scientific papers and 6 professional papers.

List of relevant titles published within the last five years:

No.	Title
1.	V.Gulan Zetić; V. Stehlik-Tomas; S. Grba; L. Lutilsky; D. Kozlek (2001): Chromium uptake by Saccharomyces cerevisiae and isolation of glucose tolerance factor from biomass. Journal of Biosciences 26 (1) 217-223
2.	S. Grba; V. Stehlik-Tomas; D. Stanzer; N. Vahčić; V. Gulan Zetić (2003): Uptake of Iron by Yeast Cells and its Impact on Biomass Prouction. Acta Allimentaria 32 (3) 279-287)
3.	V. Stehlik-Tomas; V. Gulan Zetić; D. Stanzer; S. Grba (2004): Enrichment in Yeast Saccharomyces cerevisiae. Food Technology and Biotechnology 42 (2) 115-120.
4.	D. Stanzer; S. Grba; V. Stehlik-Tomas; J. Mrvčić (2004): Utjecaj dodatka melase na kinetiku alkoholne feremtacije sirutke s pomoću kvasca Kluyveromyces marxianus Mljekarstvo 54 (1) 27-38.
5.	

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	S. Grba; V. Stehlik-Tomas (1985): Proizvodnja jednostaničnih proteina s pomoću kvasca Kluyveromyces fragilis na sirutki. Mljekarstvo 35 (5) 138-145.
2.	Ž. Čović; S. Grba; V. Stehlik-Tomas (1992): Optimiranje uzgoja pekarskog kvasca. prehrambeno-tehnol.biotehnol.rev. 30 (2-3) 117-121.
3.	D. Stanzer; V. Stehlik-Tomas; V. Gulan Zetić; J. Manenica: Sirutka-alternativbna sirovina za proizvodnju prehrambenog kvasca (2002): Mljekarstvo 52 (2) 113-124.
4.	
5.	

Curriculum course (subject) instructor:

Full professor	Slobodan	Grba
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Food Technology and Engeenering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Production and use of baker and food yeast

E-mail address: sgrba@pbf.hr

Address of personal web page:

Date of last review: 12 .01. 1999. Full professor

CV (no more than 1200 characters):

Dr.sc. Slobodan Grba was born in Narta, on 16.04. 1942.R.Croatia. Elementary and High School he attended in Croatia and was graduated at High School in Zagreb 1960. Study of Biotechnology on Faculty of Technology enrolled at the same year and ended the study in 1966. Post graduated study he finished 1973. at the University of Zagreb and become Ms. degree in biotechnology. After that he performed the Ph.D. Thesis in 1976. on the Faculty of Food Technology and Biotechnology, University of Zagreb. Professional work he started in PLIVA factory, in the production of antibiotics. After that (1969) he was elected as assistant in Department of Biotechnology for the subject of Fermentation technology at Faculty of Technology in Zagreb. Assistant professor at the same faculty become in 1979. As associated professor was elected in 1989 at the Faculty of Food Technology and Biotechnology in Zagreb. Full professor become in 1991.on the same faculty.

Today he is head of Laboratory of Fermentation Technology and Yeast at the Faculty of Food Technology and Biotechnology. During his professional training he attended ALKO Institute (Finland) for 18 months, twice 1971/72. 1974. and in USA for three weeks. His professional works resulted in the cooperation with industry almost all the time. He published 35 scientific papers and about 20 professional papers, technological studies, 1 patent, mainly in the field of fermentation technology and biochemical engineering.

List of relevant titles published within the last five years:

No.	Title
1.	Gulan Zetić, V., Stehlik-Tomas, V., Grba, S., Lutilsky, L., Kozlek, D.: Chromium Uptake by Saccharomyces cerevisiae and Isolation of Glucose Tolerance Factor from Yeast Biomass. (2001) J. Biosci. 26 (2) 217-223.
2.	Grba, S; Stehlik-Tomas, V; Stanzer, D; Vahčić, N; Škrlin, A: Selection of Yeast Strain Kluyveromyces marxianus for Alcohol and Biomass Production on Whey (2002) Chem. Bio. Eng. Q. 16 (1) 13-16.
3.	**Stehlik-Tomas, V; Grba, S; Stanzer, D; Vahčić, Gulan-Zetić, V; Uptake of Iron by Yeast Cells and its Impact on Biomass Production (2003). Acta Alimentaria 32 (3) 279-287.**
4.	**Stehlik-Tomas, V; Gulan Zetić, V; Stanzer, D; Grba, S: Zinc, Copper and Manganese Enrichment in Yeast Saccharomyces cerevisiae (2004) Food Technology and Biotechnology, 42 (2) 115-120.**
5.	**Stanzer, D; Grba, S; Stehlik-Tomas, V; Gulan Zetić, V; Mrvčić,J. The Influence of molasses addition in whey on the kinetic of alcoholic fermentation by yeast Kluyveromyces marxianus (2004) Mljekarstvo 54 (1) 27-38.**

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Grba, S., Oura, E. Suomalainen, H., (1979) Formation of Trehalose and Glycogen in Growing Baker's Yeast, Finn.Chem.Lett. (2) 61.
2.	Strel, B., Grba, S., Marić. V., (1993) Enhancement of Biomass and Fermentation Activity of Surplus Brewers Yeast in a Fed-batch Process.
3.	Čović, Ž., Grba, S., Stehlik-Tomas, V. (1992) Optimisation of bakers Yeast Production, Preh.Biotehnol.Rev. 30(2-3)117.
4.	Grba, S., Bezmalinović, I., (1994).Technological procedures for the Production of Brewers Yeast Saccharomyces uvarum for bakery , Patent HR P-920067 B_1.
5.	Grba, S., and co. (2004) Technology project of Ministry of science, «Production of Alcohol and Food Yeast on Different Substrates TP-01/0058-07.

I. BASIC DATA ON PROPOSED MODULE

Name of module: CORROSION AND MATERIAL PROTECTION

Core course of studies for module: FOOD ENGINEERING

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): 2 (III/IV)

Module status: Ground, Elective A, Elective B: Elective B

Language:
Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Scientific-educational title	name	surname
Full professor	Nada	Ciković

Number of ECTS points: 2
Total number of contact hours: 20

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	15
	Auditory Practice	
	Laboratory Practice	5
	Practicum	
	Seminar	
	Field Work	

Requirements for signature to be appended

Attained lectures and successfully accomplished laboratory work. Submitted seminary work.

Manner in which examination is taken: Written [ ] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Metallic and non-metallic materials in food industry. Aluminium, iron, tin, tinplate. Stainless steels. Electrochemical corrosion. Galvanic cell. Pourbaix curves. Kinetics of corrosion processes. Factors affecting corrosion rate. Construction and use of polarisation diagrams. Types of polarisation. Methods to reduce the rate of corrosion. Biological corrosion. Microbiological corrosion in anaerobic and aerobic conditions. Oxidation of metals and alloys. Mechanisms of ionic movement in metallic oxides. Factors which control the rate of oxidation and the laws of oxidation. The role of alloying elements in producing protective coatings. Theory of passive layer formation. Corrosion protection. Theory of cathodic protection involving sacrificial anodes. Factors which affect the choice of the method and the anode material, current and potential requirements. Corrosion inhibitors. Anodic, cathodic and mixed inhibition mechanisms. Effects on environmental conditions (moisture, pH, dissolved oxygen, presence of impurities). Protective coatings. Types and characteristics. Corrosion test methods (destructive and non-destructive methods).

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Basic knowledge on electrochemical corrosion. Recognition of corrosion problems, determination of their causes, and selection of control methods. Corrosion test methods and interpretation of results.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	ESIH, V., DUGI, Z., (1990) Tehnologija zaštite od korozije, Školska knjiga, Zagreb.
2.	ROBERTSON G.L., Food Packaging, Principles and Practice, Marcel Decker, Inc., New York 1993.
3.	
4.	
5.	

Recommended literature

No.	Title
1.	FONTANA, M.G., (1987) Corrosion Engineering, 3rd Ed., McGraw-Hill Inc., Singapore.1986.
2.	ESIH, I., (2003) Osnove površinske zaštite, Sveučilište u Zagrebu, Fakultet strojarstva i brodogradnje, Zagreb.
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION
Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full professor	Nada	Ciković
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Chemistry and Biochemistry

PBF employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:	Metallic and non-metallic materials in food industry. Aluminium, iron, tin, tinplate. Stainless steels. Electrochemical corrosion. Galvanic cell. Pourbaix diagrams. Kinetics of corrosion processes. Factors affecting corrosion rate. Construction and use of polarisation diagrams. Types of polarisation. Methods to reduce the rate of corrosion.
E-mail address:	ncikov@pbf.hr
Address of personal web page:	
Date of last review:	12 May 1998
CV (no more than 1200 characters):	Nada Ciković is professor at the University of Zagreb, Faculty of Food Technology and Biotechnology. She graduated in 1962 from the University of Zagreb, Faculty of Technology. Her teaching experience includes undergraduate (Physical chemistry, Packaging, Corrosion and material protection) and graduate (Selected topics in food packaging, Selected topics in colloidal chemistry, Chemistry of macromolecules, Phase equilibrium in multi-component systems, Packaging materials, Advances in food packaging, Thermodynamics of real systems) lectures as well as supervision of diploma (over 160), master (10) and doctoral (8) thesis. She was a principal investigator at 6 projects. Her scientific (86) and professional (24) papers are published in international and national journals and presented at numbers of meetings (92). She is a member of Editorial Board of the Trade Journal for Packaging. She was a vice-dean (1980-1984). She is also active as a member of number of the Committees at the Faculty, and the member of several scientific and professional societies. She can communicate in English, Russian, French, Germany and Italian (partly).

List of relevant titles published within the last five years:

No.	Title
1.	J.Gajdoš, K.Galić, Ž.Kurtanjek and N.Ciković, Gas permeability and DSC characteristics of polymers used in food packaging, Polym. Test., 20 (1) 49-57 (2001).
2.	K.Galić, N.Ciković, Permeability characterisation of solvent treated polymer materials, Polym. Test. 20, 599-606 (2001).
3.	K.Galić, N.Ciković, The effect of liquid absorption on gas barrier properties of triplex film coated with silicon oxide, Food Technol. Biotechnol. 41 (3) 247-251 (2003).
4.	K.Galić, N.Ciković, S. Hamin, K. Berković, Inhibition efficiency of natural compounds on tin corrosion in salt solutions, Proceedings of the Eurocorr 2001, The European Corrosion Congress, Riva del Garda, Italy, 30 September-4 October, 2001, CD-ROM, Ref.No. 183.pdf, pp. 1-7.
5.	K.Galić, N.Ciković, I.Ugarković, Barrier properties of a new generation of packaging materials, Proceedings of the 4th Croatian Congress of Food Technologists, Biotechnologists and Nutritionists - Central European Meeting, Ed., Faculty of Food Technology and Biotechnology, Zagreb, Croatia (2002) pp. 82-87.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Z.Mesić, K.Galić, N.Ciković, Physico-chemical and electrochemical characteristics of lacquered aluminium tubes aimed for food packaging, Proceedings of the Symposium on Advances in Corrosion Protection by Organic Coating II, (eds: D. Scantlebury, M.Kendig) published by The Electrochemical Society, Vol. 95-13 (1995) pp., 40-50.
2.	N. Ciković, New approach in food packaging, EFAPTEM Short Intensive Course "Advances in Food Process Engineering", Zagreb (1992). 160-166.
3.	K.Galić, N.Ciković, K. Berković, Analiza ambalažnog materijala, (Packaging materials analyses), Sveučilišni udžbenik HINUS, Zagreb (2000).
4.	Mentor: 160 diploma, 10 master, 8 doctoral works.
5.	Projects: IV-29/0058 Razvoj procesa industrijske proizvodnje i konzerviranja hrane. Zadatak:Ispitivanja korozivnog ponašanja konstrukcijskog i ambalažnog materijala u procesima prehrambene industrije, SIZ IV za znanstveni rad SR Hrvatske, 1981-1985. 1.03.04.Prehrambena tehnologija, Potprojekt: 01.03.04.02. Unapređenje tehnologije i razvoj novih proizvoda u prehrambenoj industriji, Zadatak: 01.03.04.02.08. Istraživanje odnosa hrana - ambalaža tokom proizvodnje, manipulacije i skladištenja prehrambenih proizvoda, SIZ za znanstveni rad SRH, 1986-1990. 4-07-005. Istraživanje ambalažnih materijala za pakiranje i čuvanje hrane. Ministarstvo znanosti, tehnologije i informatike RH, 1991.-1995. 4-07-058. Proučavanje fizičkih i termofizičkih svojstava hrane. Ministarstvo znanosti, tehnologije i informatike RH, 1991.-1995. 058101, Utjecaj dodataka i tehnologije pakiranja na održivost prehrambenih proizvoda (kratki naslov: Čimbenici koji utječu na održivost hrane), Ministarstvo znanosti i tehnologije, RH 1996-2000. 0058004, Metalni susceptori pri pripremi hrane u mikrovalnoj pećnici, Ministarstvo znanosti i tehnologije, RH 2003-.

PREHRAMBENO-BIOTEHNOLOŠKI FAKULTET SVEUČILIŠTA U ZAGREBU • FACULTY OF FOOD TECHNOLOGY AND BIOTECHNOLOGY, UNIVERSITY OF ZAGREB

Curriculum course (subject) instructor:

Full Professor	Katarina	Berković
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department Chemistry and Biochemistry

PBF employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed:	Biological corrosion. Microbiological corrosion in anaerobic and aerobic conditions. Oxidation of metals and alloys. Mechanisms of ionic movement in metallic oxides. Factors which control the rate of oxidation and the laws of oxidation. The role of alloying elements in producing protective coatings. Theory of passive layer formation. Corrosion protection. Theory of cathodic protection involving sacrificial anodes. Factors which affect the choice of the method and the anode material, current and potential requirements.
E-mail address:	kberkov@pbf.hr
Address of personal web page:	
Date of last review:	12th January 1999
CV (no more than 1200 characters):	Katarina Berković was born in Zagreb on 9th November 1944. In 1968 she graduated at Faculty of Technology University of Zagreb, where she started her work as an Assistant. In 1979 she finished the postgraduate study with the doctorial thesis in Chemistry. In 1985 she became an Assistant Professor, in 1991 an Associate Professor and in 1999 a Full Professor at the Faculty of Food Technology and Biotechnology University of Zagreb. Her teaching experience includes undergraduate (Physical Chemistry, Packaging, Corrosion and Material Protection) and graduate (Food Colloids, Instrumental Methods in Determination of Food Quality, Packaging materials) lectures as well as supervision of diploma (110), master (4) and doctorial (2) thesis. Her special professional interest lies in corrosion processes, especially in the potential of natural compounds to prevent or inhibit corrosion. Her scientific (32) and professional (2) papers have been published in the international and national journals and she has actively participated in the work of 25 international and 72 national meetings. She is currently Head of Laboratory for Physical Chemistry and Corrosion. She communicates in English and German.

List of relevant titles published within the last five years:

No.	Title
1.	K. Berković, S. Kovač, J. Vorkapić-Furač, Natural compounds as environmentally friendly corrosion inhibitors of aluminium, Acta Alimentaria, Vol. 33 (3) 237-247 (2004).
2.	T. Ivušić, Z. Nemet, K. Berković, L. Gracin, V. Marić, Effects of pasteurization on aluminium content and aroma compound changes in beer, Monatsschrift für Brauwissenschaft, 57 (6) 39-43 (2004).
3.	K.Galić, N.Ciković, S. Hamin, K. Berković, Inhibition efficiency of natural compounds on tin corrosion in salt solutions, Proceedings of the Eurocorr 2001, The European Corrosion Congress, Riva del Garda, CD-ROM, Ref.No. 183.pdf, pp. 1-7 (2001).
4.	K. Berković, S. Kovač, J. Vorkapić Furač, Effect of quercetin on the aluminium corrosion process, Proceedings of the 15th International Corrosion congress (Frontiers in Corrosion Science and Technology), Granada (Spain) (CD-ROM-published by CSIC Ministry of Science and Technology and Spanish Society for Industrial Chemistry) p.p. 1-6 (2002).
5.	I. Radojčić, K. Berković, K. Kovačević, K. Delonga, J. Vorkapić-Furač, Inhibition efficiency of cabbage glucosinolates extracts on tin corrosion, Proceedings of Euro Food Chem XII (Strategies of safe food), Brugge (Belgium), Vol 1. FECS Event 279, 300-303 (2003)

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	K. Berković, S. Kovač, J. Vorkapić-Furač, The effect of rutin on the aluminium corrosion process, Proceedings of EURO FOOD CHEM XI MEETING, Biologically-active phytochemicals in food (analysis, metabolism, bioavailability and function), Norwich 2001, FECS special publication No 269, 541-544 (2001)
2.	K. Galić, N. Ciković, K. Berković, Analiza ambalažnih materijala (Packaging materials analyses), Sveučilišni udžbenik HINUS, Zagreb (2000)
3.	K. Berković, I. Radojčić, K. Delonga, J. Vorkapić-Furač, Polyphenols-environmentally friendly corrosion inhibitors of tin, Current Studies of Biotechnology-Volume III, Chapter IV, New Approaches in Food Processing, Croatian Society of Biotechnology and Medicinska knjiga, Zagreb, 365-372 (2003)
4.	**J. Pospišil, K. Berković, V. Dragović-Uzelac, Comparison of physico-chemical properties of PE-LD films and PE-LD films modified by starch for frozen spinach packaging, Proceedings of the 4th Croatian Congress of FoodTechnologists, Biotechnologists and Nutritionists – Central European Meeting, Opatija, 2001, Croatia, Faculty of Food Technology and Biotechnology, Zagreb 88-94 (2002)**
5.	Supervision of 110 diploma, 4 master and 2 doctorial thesis

Curriculum course (subject) instructor:

Full professor	Kata	Galić
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of chemistry and biochemistry

PBF employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Corrosion inhibitors. Anodic, cathodic and mixed inhibition mechanisms. Effects on environmental conditions (moisture, pH, dissolved oxygen, presence of impurities). Protective coatings. Types and characteristics. Corrosion test methods (destructive and non-destructive methods).

E-mail address: kgalic@pbf.hr
Address of personal web page:

Date of last review: 19 June 2001

CV (no more than 1200 characters): Kata Galić is professor at the University of Zagreb, Faculty of Food Technology and Biotechnology (PBF). She graduated in 1982, and received her M.Sc. in 1985 and Ph.D. degree in 1989, from the PBF, University of Zagreb. She received The British Council Fellowship, (1990-1991); J.W.T. Jones Fellowship (1994). She is the member of numbers of national societies as well as the member of the Royal Society of Chemistry in UK and the Institute of Food Technologists in USA. Her research interest includes permeability characteristics of polymeric materials and factors affecting barrier changes of polymers. Her scientific (25) and professional (16) papers are published in international and national journals and presented at numbers of meetings (35). Her teaching experience includes undergraduate (Packaging, Corrosion and material protection) and graduate (Packaging materials, Advances in food packaging) lectures as well as supervision of diploma (29), master (1) and doctoral (1) thesis. She is a member of Editorial Board of the Trade Journal for Packaging, as well as member of Scientific Council at the Institute for packaging and material handling in Croatia. She was a vice-dean for the international scientific cooperation (2001-2003). She is also active as a member of number of the Committees at the Faculty. She was a congress secretary (2001, 2003) for the international congress organisation.

List of relevant titles published within the last five years:

No.	Title
1.	J.Gajdoš, K.Galić, Ž.Kurtanjek and N.Ciković, Gas permeability and DSC characteristics of polymers used in food packaging, Polym. Test., 20 (1) 49-57 (2001).
2.	K.Galić, N.Ciković, Permeability characterisation of solvent treated polymer materials, Polym. Test. 20, 599-606 (2001).
3.	K.Galić, N.Ciković, The effect of liquid absorption on gas barrier properties of triplex film coated with silicon oxide, Food Technol. Biotechnol. 41 (3) 247-251 (2003).
4.	K.Galić, N.Ciković, S. Hamin, K. Berković, Inhibition efficiency of natural compounds on tin corrosion in salt solutions, Proceedings of the Eurocorr 2001, The European Corrosion Congress, Riva del Garda, Italy, 30 September-4 October, 2001, CD-ROM, Ref.No. 183.pdf, pp. 1-7.
5.	K.Galić, N.Ciković, I.Ugarković, Barrier properties of a new generation of packaging materials, Proceedings of the 4th Croatian Congress of Food Technologists, Biotechnologists and Nutritionists - Central European Meeting, Ed., Faculty of Food Technology and Biotechnology, Zagreb, Croatia (2002) pp. 82-87.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	K.Galić, M.Pavić, and N.Ciković, The Effect of Inhibitors on Tin Corrosion in Sodium Chloride Solution, Corr. Sci., 36 (5) 785-795 (1994).;
2.	K.Galić, N.Ciković, Inhibition effect of amino acida on the corrosion of aluminium in salt solution, Proceedings of the 15th International Corrosion Congress (Frontiers in corrosion science and technology), Granada, Spain, September, 22-27. 2002, CD_No. 459, str., 1-7.
3.	K.Galić, N.Ciković, K. Berković, Analiza ambalažnog materijala, (Packaging materials analyses), Sveučilišni udžbenik HINUS, Zagreb (2000).
4.	Mentor: 29 diploma work, 1 master (3 master works are in progress), 1 doctoral work.
5.	Principal investigator of the Project: Barrier characteristics of polymeric packaging materials TP-01/0058-09

I. BASIC DATA ON PROPOSED MODULE

Name of module: ADVANCES IN PRODUCTION, PROCESSING AND APPLICATION OF LECITHIN

Core course of studies for module: FOOD ENGINEERING

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): 2. (III/IV)

Module status: Ground, ElectiveA, Elective B: Elective B

Language: English
Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Associate professor	Željko	Mokrovčak
Scientific-educational title	name	surname

Number of ECTS points: 3
Total number of contact hours: 35

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	20
	Auditory Practice	
	Laboratory Practice	10
	Practicum	
	Seminar	5
	Field Work	

Requirements for signature to be appended
Seminar work

Manner in which examination is taken: Written [X] Oral [ ] Append X in the appropriate box

Description of module (in no more than 1200 characters):
Lectures
Technological processes of production of technical (commercial) lecithin from crude oils – conditions and dilemma. Quality of commercial soybean lecithin. Other lecithins. Production of fluid and deoiled lecithin. Modificated lecithins – production and sorts, function and specifications. Lecithin in food, pharmaceutical and other industries. Commercial lecithin and its derivates – antioxidants or synergists? Health aspects of lecithin. Analysis of phospholipids.
Laboratory Practice
Fractionation of lecithin with alcohol. Control of efficiency of fractionation procedure. Determination of phospholipid share in technical lecithin.
Seminar
Triangle diagrams. Material balance of process.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):
Getting acquainted with technological processes of production and refinement of commercial lecithin in the purpose of application in food, pharmaceutical and other industries.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	D. R. Erickson, Practical Handbook of Soybean Processing and Utilization, AOCS Press, Champaign, Illinois. 1995.
2.	H. E. Snyder, T. W. Kwon, Soybean Utilization, Van Nostrand Reinhold Co., New York, 1987.
3.	B. F. Szuhaj, G. R. List, Lecithins, AOCS Press, Champaign, Illinois. 1985.

Recommended literature

No.	Title
1.	H. Pardun, Die Pflanzenlecithine, Verlag für chem. Industrie H. Ziolkowsky KG, Augsburg, 1988.

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION
Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Associate professor	Željko	Mokrovčak
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department for food engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: ADVANCES IN PRODUCTION, PROCESSING AND APPLICATION OF LECITHIN

E-mail address: zmokra@pbf.hr

Address of personal web page: -

Date of last review: May 10th, 1998

CV (no more than 1200 characters): Born on July 4th, 1942 in Zagreb, where he finished elementary school and School of chemical technology. In 1961 he entered Technical Faculty, University of Zagreb, where he was employed as technical staff member and graduated in 1976. In 1977 he entered Postgraduate study of Chemical engineering on Technology Faculty. In 1982 he got his masters degree in biotechnical sciences, area biotechnology. He made his dissertation in Laboratory for oils and fats technology and defended it in May, 1991. He worked as technical staff member in Laboratory for oils and fats technology 1977- 1982, when he acquired vocation of assistant. He was elected to assistant professor in 1992 and to associate professor in 1998. Since 1988. he was in charge of subject Technological design in Faculty of Food Technology in Osijek and 1989-1991 he participated in teaching in Faculty of Agriculture in Sarajevo. 1997-2001 he was Head of Department for food engineering. He was a member of Initiative Committee of Croatian Biotechnical Foundation and president of Initiative Committee of Club of Food Technologists, Biotechnologists and Nutritionists.

List of relevant titles published within the last five years:

No.	Title
1.	Škevin, D., Rade, D., Štrucelj, D., Mokrovčak, Ž., Neđeral, S., Benčić, Đ. (2003) The influence of variety and harvest time on the bitterness and phenolic compounds of olive oil. Eur. J. Lipid Sci. Technol. 105 546-541.
2.	Rade, D., Mokrovčak, Ž., Štrucelj, D., Škevin, D., Neđeral, S. (2004) The Effect of Processing Conditions on the Nontriacylglycerol Constituents of Sunflower Oil, Acta Aliment. 33 7-18.
3.	Rade, D., Neđeral Nakić, S., Škevin, D., Štrucelj, D., Mokrovčak, Ž. Sterol content and composition of some non-refined and refined oils, 2nd Central European Meeting 5th Croatian Congress, 17 - 20 October 2004, Opatija, Croatia, poster.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Mokrovčak, Ž. (1991) Fractionation of soybean lecithin by selective solvents, dissertation.
2.	Mokrovčak, Ž. Liquid-liquid extraction in food technology. U: "Advances in Food Process Engineering" (Konja, G., Lovrić,T., Štrucelj, D.,Tripalo, B. Ed. Board) Short Intensive Course EFAPTEM, Prehrambeno - biotehnološki fakultet, Zagreb (1992), str. 105 – 112.
3.	Mokrovčak, Ž., Štrucelj, D., Rade, D., Mijatović, I.: Scale -up of process equipment for fractionation of soybean lecithin.Proceedings of 1st Slovenian Congress on Food and Nutrition with International Participation, Bled, April 1996, vol. I, pp. 575-581.
4.	Štrucelj, D., Mokrovčak, Ž., Jeričević, D., Rade, D.: Unapređenje tehnologije prerade industrijskog lecitina. Idejni tehnološki projekt. Tvornica za preradu soje -Zadar (1990).
5.	Štrucelj, D., Mokrovčak, Ž., Rade, D., Stastny, M.: Alcohol fractionation of soybean phospholipids u:"Phospholipids: Characterization, metabolism and novel biological applications"(Cevc, G., Paltauf, F. editors) AOCS Press, Champaign (1995), pp.348-356.

Curriculum course (subject) instructor:

Full professor	Dubravka	Štrucelj
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of food engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed:	ADVANCES IN PRODUCTION, PROCESSING AND APPLICATION OF LECITHIN
E-mail address:	dstruc@pbf.hr
Address of personal web page:	-
Date of last review:	July 14th, 1998
CV (no more than 1200 characters):	Born on March, 28th, 1940 in Zagreb. After gymnasium in 1958. she entered Department of Biotechnology on Technological Faculty in Zagreb where she graduated in 1963 and was employed as B.S. assistant in Laboratory for oil and fat technology. She got the academic title doctor of biotechnical science in 1981. She was elected to assistant professor in 1982, associate professor in 1990 and full professor in 1998. She is in charge of subjects Lipid chemistry and technology, Food engineering II and Raw material in food industry, and some subjects in postgraduate study. She supervised over 50 diploma works, 14 master theses and 3 dissertations. 1989-1991 she participated in teaching on Agricultural Faculty in Sarajevo and 2000-2004 on Faculty of Chemical Technology in Split. In 1987 as a principal investigator on USDA project she spent time on several universities and institutes in USA, and in 1992 within TEMPUS project in Gent University. She was an expert in arbitration among Croatia and USA regarding the sunflower oil import. Except international she was head investigator on 4 national scientific projects and several programs of collaboration with industry. She is a member of AOCS, IFT, Euro Fed Lipid etc. She was a member of Organization/Scientific Committee of many scientific and professional confrences. She participates actively in work of wide range of expert bodies at State Office for Standardization and Metrology, Croatian Chamber of Economy and Zagreb Fair.

List of relevant titles published within the last five years:

No.	Title
1.	Rade, Desanka; Mokrovčak, Željko; Štrucelj, Dubravka; Škevin, Dubravka; Neđeral, Sandra. The effect of processing conditions on the nontriacylglycerol constituents of sunflower oil. Acta Alimentaria. 33 (2004) , 1; 7-18
2.	Škevin, Dubravka; Rade, Desanka; Štrucelj, Dubravka; Mokrovčak, Željko; Neđeral, Sandra; Benčić, Đani. The influence of olive variety and harvest time on the bitterness and phenolic compounds of olive oil. // European Journal of Lipid Science and Technology. 105 (2003) , 9; 536-541
3.	Marušič,V., Štrucelj, D., Ivandić, Ž. Povećanje učinkovitosti procesa prerade sjemena suncokreta primjenom novih postupaka zaštite za smanjenje intenziteta trošenja dijelova pužnih preša. Kem. Ind. 53, 393 – 400 (2004).
4.	Stanić, R., Štrucelj, D. (1995) Effect of storage conditions on the quality of unrefined sunflower oil. Prehrambeno-tehnol. biotehnol. rev. 33, 37-41.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Štrucelj, D., Rade, D., Mokrovčak, Ž., Dominez, J., Jovanović, K., Rac, M., Jeričević, D.: Ispitivanje utjecaja uvjeta prerade uljarica na izdvajanje fosfolipida i unapređenje kvalitete proizvoda. Zadatak je financirao SIZ za znanost SRH (1987-1991).
2.	Štrucelj, D., Rade,D.,Mokrovčak,Ž.,Jovanović,K., Dominez,J.,Alibabić,V.,Stastny,M., Konečny-Škevin, D., Jeričević, D.: Razvoj procesa proizvodnje i frakcioniranja lecitina. Projekt je financiralo Ministarstvo znanosti i tehnologije Republike Hrvatske (1992 - 1996) (Projekt 4-07-061).

Curriculum course (subject) instructor:

Associate professor	Desanka	Rade
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of food engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: ADVANCES IN PRODUCTION, PROCESSING AND APPLICATION OF LECITHIN

E-mail address: derade@pbf.hr

Address of personal web page: -

Date of last review: March 10th, 1998

CV (no more than 1200 characters): Born on November 21st, 1942 in Vrebec, Gospić, Croatia. Chemical technical school finished in Zagreb. In 1963 she was employed as technical staff member in Section of Biotechnology at Technological Faculty, where she was also admitted as student in 1966. Graduated in 1976, got her masters in 1983 and doctoral degree in 1990. 1963-1977 she worked as technician in Laboratory for Oils and fats technology, 1977-1983 as B.S. assistant, 1983-1991 as assistant, 1991-1998 as assistant professor and since 1998 as associate professor on the same subject. 1992 she was in Zug, Switzerland on "Gas chromatography training course" and in 1996 spent two weeks in Palm Oil Research Institute of Malaysia. She participates in subjects Lipid chemistry and technology, Food preparation processes, and is in charge of subject Basic technologies of vegetable origin food preparation and subject in postgraduate study Food additives. Since 2002. year is principal investigator on a scientific project, She supervised about 40 diploma works, 2 master theses and one dissertation. She has published 11 papers in journals indexed in international system and 20 papers published in journals with national reviewing and proceedings of international and domestic scientific conferences.

List of relevant titles published within the last five years:

No.	Title
1.	Rade, Desanka; Mokrovčak, Željko; Štrucelj, Dubravka; Škevin, Dubravka; Neđeral, Sandra. The effect of processing conditions on the nontriacylglycerol constituents of sunflower oil. Acta Alimentaria. 33 (2004) , 1; 7-18
2.	Škevin, Dubravka; Rade, Desanka; Štrucelj, Dubravka; Mokrovčak, Željko; Neđeral, Sandra; Benčić, Đani. The influence of olive variety and harvest time on the bitterness and phenolic compounds of olive oil. European Journal of Lipid Science and Technology. 105 (2003) , 9; 536-541
3.	Rimac Brnčić, Suzana; Lelas, Vesna; Rade, Desanka; Šimundić, Borislav. Decreasing of oil absorption in potato strips during deep fat frying. Journal of Food Engineering. 64 (2004) ; 237-241
4.	
5.	

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Rade Desanka (1990) Effect of rapeseed processing conditions on phospholipdis of crude and degummed oils, dissertation.
2.	Rade, D., Štrucelj, D., Mokrovčak, Ž.: Effect of soybean pretreatment on the phospholipid content in crude and degummed oils. Fett Wissenschaft Technol. (Fat Sci. Technol.) 97, 501-507 (1995).

I. BASIC DATA ON PROPOSED MODULE

Name of module: **SHELF-LIFE OF PACKAGED FOODSTUFFS**

Core course of studies for module: **FOOD ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): **2 (III/IV)**

Module status: Ground, Elective A, Elective B **Elective B**

Language: English

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full professor	**Kata**	**Galić**
Scientific-educational title	name	surname

Number of ECTS points 2

Total number of contact hours: 20

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	10
	Auditory Practice	
	Laboratory Practice	10
	Practicum	
	Seminar	
	Field Work	

Requirements for signature to be appended

Attained lectures and successfully accomplished laboratory work. Submitted seminary work.

Manner in which examination is taken: Written [X] Oral [ ] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Principles of Modified atmosphere packaging (MAP). Packaging atmosphere (product respiration, film permeability, temperature, oxygen, N2, CO2).Gas permeation in films (monofilms and laminates). Gas permeation in perforated films. Permeation mechanisms (absorption, diffusion, desorption). Diffusion, Solubility and permeability coefficients. Design of polymeric packages (optimum package atmosphere, respiration rate with regards to product; weight of product, film permeability, film thickness, film area). Permeability ration. Recommended modified atmosphere with regards to specific food product. Prediction of shelf life of packaged water-sensitive foods. Prediction of shelf life of packaged oxygen-sensitive foods. Predicting Shelf Life from Accelerated Data. Standards and legislations.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

On completion of this module student will be able to make a decision on packaging material and method selection with regards to specific food product and its susceptibility to environmental condition in order to extend the shelf-life and preserve food quality.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	ROBERTSON G.L., Food Packaging, Principles and Practice, Marcel Decker, Inc., New York 1993.
2.	CROSBY N. T., Food Packaging Materials, Applied Science Publishers Ltd., London, 1981.
3.	
4.	
5.	

Recommended literature

No.	Title
1.	MATHLOUTHI, M. (ed), Food packaging and preservation, Elsevier Applied Science Publishers, New York, 1986.
2.	ACKERMANN P., JÄGERSTAD M., OHLSSON T. (eds): Foods and packaging materials - Chemical interaction, The Royal Society of Chemistry, Cambridge, 1995.
3.	BRISTON, J. H., Plastic Films, Longman Singapore Publishers Ltd., Singapore 1990.
4.	CAMPION, R.P., Permeation through polymers, Material Technology Institute of the Chemical Process Industries, Inc. Amsterdam 2000.
5.	SACHAROW, S., GRIFFIN, R. C., Principle of Food Packaging, AVI Publishing Company, Westport, Connecticut, 1980.

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full professor	Kata	Galić
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor	Department of chemistry and biochemistry

PBF employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:	Recommended modified atmosphere with regards to specific food product. Prediction of shelf life of packaged water-sensitive foods. Prediction of shelf life of packaged oxygen-sensitive foods. Predicting Shelf Life from Accelerated Data. Standards and legislations.
E-mail address:	kgalic@pbf.hr
Address of personal web page:	
Date of last review:	19 June 2001
CV (no more than 1200 characters):	Kata Galić is professor at the University of Zagreb, Faculty of Food Technology and Biotechnology (PBF). She graduated in 1982, and received her M.Sc. in 1985 and Ph.D. degree in 1989, from the PBF, University of Zagreb. She received The British Council Fellowship, (1990-1991); J.W.T. Jones Fellowship (1994). She is the member of numbers of national societies as well as the member of the Royal Society of Chemistry in UK and the Institute of Food Technologists in USA. Her research interest includes permeability characteristics of polymeric materials and factors affecting barrier changes of polymers. Her scientific (25) and professional (16) papers are published in international and national journals and presented at numbers of meetings (35). Her teaching experience includes undergraduate (Packaging, Corrosion and material protection) and graduate (Packaging materials, Advances in food packaging) lectures as well as supervision of diploma (29), master (1) and doctoral (1) thesis. She is a member of Editorial Board of the Trade Journal for Packaging, as well as member of Scientific Council at the Institute for packaging and material handling in Croatia. She was a vice-dean for the international scientific cooperation (2001-2003). She is also active as a member of number of the Committees at the Faculty. She was a congress secretary (2001, 2003) for the international congress organisation.

List of relevant titles published within the last five years:

No.	Title
1.	J.Gajdoš, K.Galić, Ž.Kurtanjek, N.Ciković, Gas permeability and DSC characteristics of polymers used in food packaging, *Polym. Test*., 20 (1) 49-57 (2001).
2.	K.Galić, N.Ciković, Permeability characterisation of solvent treated polymer materials, *Polym. Test.* 20, 599-606 (2001).
3.	K.Galić, N.Ciković, The effect of liquid absorption on gas barrier properties of triplex film coated with silicon oxide, *Food Technol. Biotechnol*. 41 (3) 247-251 (2003).
4.	K.Galić, N.Ciković, S. Hamin, K. Berković, Inhibition efficiency of natural compounds on tin corrosion in salt solutions, Proceedings of the Eurocorr 2001, The European Corrosion Congress, Riva del Garda, Italy, 30 September-4 October, 2001, CD-ROM, Ref.No. 183.pdf, pp. 1-7.
5.	K.Galić, N.Ciković, I.Ugarković, Barrier properties of a new generation of packaging materials, Proceedings of the 4th Croatian Congress of Food Technologists, Biotechnologists and Nutritionists - Central European Meeting, Ed., Faculty of Food Technology and Biotechnology, Zagreb, Croatia (2002) pp. 82-87.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	K.Galić, (Selection of Food Packaging Materials: I-Cereals, Bakery and Confectionery Goods) *Ambalaža*, 1, 20-25 (2000).: II-Fruits and Vegetables), *Ambalaža*, 2, 14-19 (2000).: III-Meat and Fish), *Ambalaža*, 3, 13-18 (2000).: IV-Milk and Dairy Products), *Ambalaža*, 4, 15-18 (2000).: V-Alcoholic and Soft Beverage), *Ambalaža*, 1, 19-23 (2001).
2.	K. Galić, Food-packaging interaction – part I, Ambalaža, 4, 19-24 (2003), – part II, 1, 19-23 (2004), (A Review).
3.	K.Galić, N.Ciković, K. Berković, Analiza ambalažnog materijala (Packaging materials analyses), Sveučilišni udžbenik HINUS, Zagreb (2000).
4.	Mentor: 29 diploma work, 1 master (3 master works are in progress), 1 doctoral work.
5.	Principal investigator of the Project: Barrier characteristics of polymeric packaging materials TP-01/0058-09

Curriculum course (subject) instructor:

Full professor	Nada	Ciković
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Chemistry and Biochemistry

PBF employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Principles of Modified atmosphere packaging (MAP). Packaging atmosphere (product respiration, film permeability, temperature, oxygen, N2, CO2).Gas permeation in films (monofilms and laminates). Gas permeation in perforated films.

E-mail address: ncikov@pbf.hr

Address of personal web page:

Date of last review: 12 May 1998

CV (no more than 1200 characters): Nada Ciković is professor at the University of Zagreb, Faculty of Food Technology and Biotechnology. She graduated in 1962 from the University of Zagreb, Faculty of Technology.
Her teaching experience includes undergraduate (Physical chemistry, Packaging, Corrosion and material protection) and graduate (Selected topics in food packaging, Selected topics in colloidal chemistry, Chemistry of macromolecules, Phase equilibrium in multi-component systems, Packaging materials, Advances in food packaging, Thermodynamics of real systems) lectures as well as supervision of diploma (over 160), master (10) and doctoral (8) thesis. She was a principal investigator at 6 projects. Her scientific (86) and professional (24) papers are published in international and national journals and presented at numbers of meetings (92). She is a member of Editorial Board of the Trade Journal for Packaging. She was a vice-dean (1980-1984). She is also active as a member of number of the Committees at the Faculty, and the member of several scientific and professional societies. She can communicate in English, Russian, French, Germany and Italian (partly).

List of relevant titles published within the last five years:

No.	Title
1.	J.Gajdoš, K.Galić, Ž.Kurtanjek and N.Ciković, Gas permeability and DSC characteristics of polymers used in food packaging, *Polym. Test*., 20 (1) 49-57 (2001).
2.	K.Galić, N.Ciković, Permeability characterisation of solvent treated polymer materials, *Polym. Test.* 20, 599-606 (2001).
3.	K.Galić, N.Ciković, The effect of liquid absorption on gas barrier properties of triplex film coated with silicon oxide, *Food Technol. Biotechnol*. 41 (3) 247-251 (2003).
4.	K.Galić, N.Ciković, S. Hamin, K. Berković, Inhibition efficiency of natural compounds on tin corrosion in salt solutions, Proceedings of the Eurocorr 2001, The European Corrosion Congress, Riva del Garda, Italy, 30 September-4 October, 2001, CD-ROM, Ref.No. 183.pdf, pp. 1-7.
5.	K.Galić, N.Ciković, I.Ugarković, Barrier properties of a new generation of packaging materials, Proceedings of the 4th Croatian Congress of Food Technologists, Biotechnologists and Nutritionists - Central European Meeting, Ed., Faculty of Food Technology and Biotechnology, Zagreb, Croatia (2002) pp. 82-87.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	K.Galić, N.Ciković, J.Pospišil, Interakcije u sustavu hrana-plastična ambalaža, *Ambalaža*, 1 (1) 12-17 (1996).
2.	N. Ciković, New approach in food packaging, EFAPTEM Short Intensive Course "Advances in Food Process Engineering", Zagreb (1992). 160-166.
3.	K.Galić, N.Ciković, K. Berković, Analiza ambalažnog materijala (Packaging materials analyses), Sveučilišni udžbenik HINUS, Zagreb (2000).
4.	Mentor: 160 diploma, 10 master, 8 doctoral works.
5.	Projects: IV-29/0058 Razvoj procesa industrijske proizvodnje i konzerviranja hrane. Zadatak:Ispitivanja korozivnog ponašanja konstrukcijskog i ambalažnog materijala u procesima prehrambene industrije, SIZ IV za znanstveni rad SR Hrvatske, 1981-1985. 1.03.04. Prehrambena tehnologija, Potprojekt: 01.03.04.02. Unapređenje tehnologije i razvoj novih proizvoda u prehrambenoj industriji, Zadatak: 01.03.04.02.08. Istraživanje odnosa hrana - ambalaža tokom proizvodnje, manipulacije i skladištenja prehrambenih proizvoda, SIZ za znanstveni rad SRH, 1986-1990. 4-07-005. Istraživanje ambalažnih materijala za pakiranje i čuvanje hrane. Ministarstvo znanosti, tehnologije i informatike RH, 1991.-1995. 4-07-058. Proučavanje fizičkih i termofizičkih svojstava hrane. Ministarstvo znanosti, tehnologije i informatike RH, 1991.-1995. 058101, Utjecaj dodataka i tehnologije pakiranja na održivost prehrambenih proizvoda (kratki naslov: Čimbenici koji utječu na održivost hrane), Ministarstvo znanosti i tehnologije, RH 1996-2000. 0058004, Metalni susceptori pri pripremi hrane u mikrovalnoj pećnici, Ministarstvo znanosti i tehnologije, RH 2003-.

Curriculum course (subject) instructor:

Full Professor	Katarina	Berković
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department Chemistry and Biochemistry

PBF employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed:	Permeation mechanisms (absorption, diffusion, desorption). Diffusion, Solubility and permeability coefficients. Design of polymeric packages (optimum package atmosphere, respiration rate with regards to product; weight of product, film permeability, film thickness, film area). Permeability ration.
E-mail address:	kberkov@pbf.hr
Address of personal web page:	
Date of last review:	12th January 1999
CV (no more than 1200 characters):	Katarina Berković was born in Zagreb on 9th November 1944. In 1968 she graduated at Faculty of Technology University of Zagreb, where she started her work as an Assistant. In 1979 she finished the postgraduate study with the doctorial thesis in Chemistry. In 1985 she became an Assistant Professor, in 1991 an Associate Professor and in 1999 a Full Professor at the Faculty of Food Technology and Biotechnology University of Zagreb. Her teaching experience includes undergraduate (Physical Chemistry, Packaging, Corrosion and Material Protection) and graduate (Food Colloids, Instrumental Methods in Determination of Food Quality, Packaging materials) lectures as well as supervision of diploma (110), master (4) and doctorial (2) thesis. Her special professional interest lies in corrosion processes, especially in the potential of natural compounds to prevent or inhibit corrosion. Her scientific (32) and professional (2) papers have been published in the international and national journals and she has actively participated in the work of 25 international and 72 national meetings. She is currently Head of Laboratory for Physical Chemistry and Corrosion. She communicates in English and German.

List of relevant titles published within the last five years:

No.	Title
1.	K. Berković, S. Kovač, J. Vorkapić-Furač, Natural compounds as environmentally friendly corrosion inhibitors of aluminium, Acta Alimentaria, Vol. 33 (3) 237-247 (2004).
2.	T. Ivušić, Z. Nemet, K. Berković, L. Gracin, V. Marić, Effects of pasteurization on aluminium content and aroma compound changes in beer, Monatsschrift für Brauwissenschaft, 57 (6) 39-43 (2004).
3.	K.Galić, N.Ciković, S. Hamin, K. Berković, Inhibition efficiency of natural compounds on tin corrosion in salt solutions, Proceedings of the Eurocorr 2001, The European Corrosion Congress, Riva del Garda, CD-ROM, Ref.No. 183.pdf, pp. 1-7 (2001).
4.	K. Berković, S. Kovač, J. Vorkapić Furač, Effect of quercetin on the aluminium corrosion process, Proceedings of the 15th International Corrosion congress (Frontiers in Corrosion Science and Technology), Granada (Spain) (CD-ROM- published by CSIC Ministry of Science and Technology and Spanish Society for Industrial Chemistry) p.p. 1-6 (2002).
5.	I. Radojčić, K. Berković, K. Kovačević, K. Delonga, J. Vorkapić-Furač, Inhibition efficiency of cabbage glucosinolates extracts on tin corrosion, Proceedings of Euro Food Chem XII (Strategies of safe food), Brugge (Belgium), Vol 1. FECS Event 279, 300-303 (2003)

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	K. Berković, S. Kovač, J. Vorkapić-Furač, The effect of rutin on the aluminium corrosion process, Proceedings of EURO FOOD CHEM XI MEETING, Biologically-active phytochemicals in food (analysis, metabolism, bioavailability and function), Norwich 2001, FECS special publication No 269, 541-544 (2001)
2.	K. Galić, N. Ciković, K. Berković, Analiza ambalažnih materijala (Packaging materials analyses), Sveučilišni udžbenik HINUS, Zagreb (2000)
3.	K. Berković, I. Radojčić, K. Delonga, J. Vorkapić-Furač, Polyphenols-environmentally friendly corrosion inhibitors of tin, Current Studies of Biotechnology-Volume III, Chapter IV, New Approaches in Food Processing, Croatian Society of Biotechnology and Medicinska knjiga, Zagreb, 365-372 (2003)
4.	J. Pospišil, K. Berković, V. Dragović-Uzelac, Comparison of physico-chemical properties of PE-LD films and PE-LD films modified by starch for frozen spinach packaging, Proceedings of the 4th Croatian Congress of FoodTechnologists, Biotechnologists and Nutritionists – Central European Meeting, Opatija, 2001, Croatia, Faculty of Food Technology and Biotechnology, Zagreb 88-94 (2002)
5.	Supervision of 110 diploma, 4 master and 2 doctorial thesis

I. BASIC DATA ON PROPOSED MODULE

Name of module: **THE MICROBIOLOGICAL, CHEMICAL AND PHYSICAL MONITORING IN BREWING PROCESS**

Core course of studies for module: **BIOTECHNOLOGY**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): **2/IV**

Module status: Ground, Elective A, Elective B **Elective B**

Language: Croatian

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Assistant Professor	Sunčica	Beluhan
Scientific-educational title	Name	Surname

Number of ECTS points 3

Total number of contact hours: 40

Manner in which direct instruction is conducted:

Types of instruction		Hours
symbol	Title	
	Lectures	16
	Auditory Practice	
	Laboratory Practice	12
	Practicum	6
	Seminar	6
	Field Work	

Requirements for signature to be appended

Tidily attending classes, laboratory practices, practicum and seminars.

Manner in which examination is taken: Written [X] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

The microbiological threat to the brewing process. Outline of the complete brewing process indicating steps in which there is a potential for microbiological contaminations. The microflora of barley and malt. Beer-spoilage microorganisms. Wild yeast in brewing. Gram-positive and Gram-negative beer spoilage bacteria. Traditional and rapid microbiological techniques used in the detection and identification of brewery bacteria and wild yeasts. Microbiological media used in brewing laboratories. Chemical and physical properties of beer. Nutritive value of beer. Sensory changes in beer flavour during ageing (flavour stability). Sensory analysis. Physical, chemical and microbiological clearliness. Standards required within a brewing and elements of HACCP analysis. Sampling devices. Microbiological quality assurance. Disinfection of pitching yeast. Cleaning and disinfection in the brewery. CIP systems and validation of CIP.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Knowledge about potential microbial contaminations in each step of brewing process. Knowledge of high standards of hygiene achieved within the brewery. Skill of beer sensory analysis.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	Brewing Microbiology (F. G. Priest and I. Campbell, Eds.), Second Edition, Chapman & Hall, 1996.
2.	Brewing: Science and Practice (D. E. Briggs, P. A Brookes, R. Stevens and C. A. Boulton, Eds.), Woodhead Publishing limited, 2003.
3.	W. Kunze, Technology Brewing and Malting (Int. ed.), Westekreuz-Druckerei Ahreis KG, Berlin, 1996.
4.	
5.	

Recommended literature

No.	Title
1.	American Society of Brewing Chemists, Methods of Analysis, 8th edn, St. Paul. Minnesota, 1992.
2.	Bridson, E. Y., Oxoid Manual, 8th edn, Oxoid Ltd., Hampshire, UK, 1998.
3.	European Brewery Convention, Analytica Microbiologica Vol. II, 5th edn, H. C. Verlag, Germany, 1998.
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Assistant Professor	Sunčica	Beluhan
Scientific-educational title	Name	Surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: **THE MICROBIOLOGICAL, CHEMICAL AND PHYSICAL MONITORING IN BREWING**

E-mail address: sunbel@pbf.hr

Address of personal web page:

Date of last review: January 19, 2005

CV (no more than 1200 characters): Born on July 9, 1967. Educated in Virovitica and Zagreb. On Faculty of Food Technology and Biotechnology, Department of Biochemical Engineering, University of Zagreb, she made her Diploma work, Master and Doctoral thesis (B.Sc. 1989., M.Sc. 1994., PhD. 2001). Position title is the Assistant Professor.
Research and professional experience (1990 - 1994. Research Associate, 1994 – 2001. Teaching Assistant, 2001 – 2005. Teaching Associate, 2005 - Assistant Professor). As author and co-author, she published 5 scientific and 4 professional papers. She is the holder of one current occupant technological project. Speaks, writes and reads English language.

List of relevant titles published within the last five years:

No.	Title
1.	D. Beluhan, S. Beluhan, Hybrid Modelling Approach to On-line Estimation of Yeast Biomass Concentration in Industrial Bioreactor. *Biotechnology Letters*, 22 (8) (2000), 631-635.
2.	S. Beluhan, I. Karmelić, S. Novak, V. Marić, Partial Purification and Biochemical Characterization of Alkaline 5'-Phosphodiesterase from Barley Malt Sprouts, *Biotechnology Letters*, 25 (13) (2003). 1099-1103.
3.	S. Beluhan, V. Marić, *Umami* taste: from surplus brewer's yeast to 5'-ribonucleotides, *Current Studies of Biotechnology*, Vol. III - Food, Zagreb, 2003, 223-228.
4.	S. Beluhan, Nova valorizacija sladnih klica, nusproizvoda sladara, *Svijet piva* 6 (2001), 35; 10-13.
5.	S. Beluhan, Okusne supstancije iz pivskog kvasca, *Svijet piva* 7 (2001), 37, 9-13.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	D. Beluhan, S. Beluhan, Hybrid Modelling Approach to On-line Estimation of Yeast Biomass Concentration in Industrial Bioreactor. *Biotechnology Letters*, 22 (8) (2000), 631-635.
2.	S. Beluhan, I. Karmelić, S. Novak, V. Marić, Partial Purification and Biochemical Characterization of Alkaline 5'-Phosphodiesterase from Barley Malt Sprouts, *Biotechnology Letters*, 25 (13) (2003). 1099-1103.
3.	S. Beluhan, V. Marić, *Umami* taste: from surplus brewer's yeast to 5'-ribonucleotides, *Current Studies of Biotechnology*, Vol. III - Food, Zagreb, 2003, 223-228.
4.	Beluhan, Damir ; Beluhan, Sunčica. 5'- ribonucleotides mixtures resolutions by ANNs using UV spectroscopic data // 9th EUROPEAN CONGRESS ON BIOTECHNOLOGY Book of Abstract E2975. Brussels: 1999. ECB9/2975.
5.	Beluhan, Sunčica ; Cerovečki, N. ; Marić, Vladimir. Barley malt sprouts as a source of 5'- phosphodiesterase activity // 9th EUROPEAN CONGRESS ON BIOTECHNOLOGY Book of Abstract E2974 . Brussels : , 1999. ECB9/2974.

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION
Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Full Professor	Vladimir	Marić
Scientific-educational title	name	Surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering
FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] Instructor [X] Append X in the appropriate box

Title of curriculum module executed: **THE MICROBIOLOGICAL, CHEMICAL AND PHYSICAL MONITORING IN BREWING**

E-mail address: vmaric@pbf.hr
Address of personal web page:
Date of last review: Januar 16th 1996.

CV (no more than 1200 characters):

Born on January 11th, 1939. Educated in Daruvar and Zagreb. On Biotechnology Department, Faculty of Technology, Zagreb he made his diploma work, master and doctoral theses. Specialisation at the Institute of microbiology, ETH Zuerich (2 times 6 months in 1974. and 1978.) and at the English High Brewing School in Birmingham (10 months 1974/1975). He worked in Daruvar Brewery (1964-1966), Department of Biotehnology, Faculty of Technology (assistant, 1966-1973; assistant professor, 1973-1976; associate professor; 1976- 1979.) and Department of biochemical engineering, Faculty of Food Technology and Biotechnology, Zagreb (full professor, 1980.; head of Department of biochemical engineering, 1980-1984 and 2004-; dean 1984-1988., full professor with tenure, since 1996 -). He is a guest lecturer on the Faculty of Food Technology in Osijek, Faculty of Chemical Technology in Split, Biotechnical Faculty in Ljubljana and High School in Karlovac. He was a president of Council for biotechnical sciences, a member of Croatian National Council for Science (1994-1998), and a member of Management of Karlovac Brewery (1993-2002.). He is a member of Croatian Academy of Technical Science, Deputy Editor of scientific journal Food Technology and Biotechnology and Editor in Chief of professional journal Svijet piva. As author and co-author he published more than 70 scientific and 38 professional papers and 14 elaborates and technological projects. Speaks, writes and reads English, and can use Russian and German languages.

List of relevant titles published within the last five years:

No.	Title
1.	Bauman, M., Mesarić, M., Ribar, S., Marić, V. (2001) Natural zeolite clinoptilolite increases concentrations of sphingoid bases in the yeast *Yarrowia lipolytica*. J. Basic Microbiology, 41, 1, 7-16
2.	Bauman, M., Mesarić, M., Ribar, S., Marić, V. (2002) Dependence of the sphingoid bases concentration on growth phase and temperature in the yeast *Yarrowia lipolytica*. Journal of Basic Microbiology. 42, 1, 3-12
3.	Beluhan, S.. Karmelić, I., Novak, S., Marić, V. (2003) Partial purification and biochemical characterization of alkaline 5'-phosphodiesterase from barley malt sprouts. Biotechnology Letters 25, 13; 1099-1103.
4.	M. Ivančić, B. Šantek, S. Novak, and V. Marić, Fermentative bioconversion in a horizontal rotating tubular bioreactor. Proc. Biochem. 39 (8); 995 - 1000; 2004.
5.	A. Slavica, B. Šantek, S. Novak and V. Marić, Microbial acetate oxidation in horizontal rotating tubular bioreactor. J. Biosci. 29; 169 - 177; 2004

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	V. Marić, Tehnologija slada i piva, (Interna skripta), Zagreb, 1987
2.	K. Štefančić i V. Marić, Pivarski priručnik, Zagreb, 1989.
3.	V. Marić i Z. Nadvornik, Pivo-tekuća hrana, Zagreb, 1995.
4.	V. Marić, Biotehnologija i sirovine, SIP, Zagreb, 2000
5.	Strel, B., Grba, S. i Marić, V.(1993) Enhancement of biomass and fermentation activity of surplus brewer's yeast in fed-batch process. Appl. Microbiol. Biotechnol. **39**, 53 - 57

I. BASIC DATA ON PROPOSED MODULE

Name of module: **BIOINORGANIC CHEMISTRY OF ELEMENTS**

Core course of studies for module: **BIOPROCESS ENGINEERING**
BIOTECHNOLOGY
NUTRITION

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): **1., 2.**

Module status: Ground, ElectiveA, Elective B Elective B

Language: english
Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full prof.	**Božidar**	**Grabarić**
Scientific-educational title	name	surname

Number of ECTS points 3
Total number of contact hours: 30

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	30
	Auditory Practice	
	Laboratory Practice	
	Practicum	
	Seminar	
	Field Work	

Requirements for signature to be appended

The requirements for signature certification are taking part in the course.

Manner in which examination is taken: Written [X] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

The course gives the students fundamentals of bioinorganic chemistry, including the overview of properties of elements essential for biological and biochemical processes, biological availability of elements, speciation of elements, coordination properties of metal ions, complexes and stability constants, enzyme-substrate bonding, selectivity, chemistry of hydrogen, role of sodium, potassium and chlorine in biosystems, biochemistry of magnesium and metabolism of phosphates, as well as the role of Ca, Cu, Ni, Co, P, Si and other non-metals in biological and biochemical processes.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Understanding the role of metal ions and non-metals in biological and biochemical processes, as well as the relationship between the selectivity and coordination properties. Development of interdisciplinary thinking.

Literature (list should include details on publisher and year of publication):
Compulsory literature

No.	Title
1.	J.J.R. Frausto da Silva, R.J.P.Williams: The biological chemistry of the elements, Oxford University Press, Oxford, 2001.
2.	

Recommended literature

No.	Title
1.	I. Bertini, H. B. Gray, S. J. Lippard, J. S. Valentine: Bioinorganic chemistry, University Sciense Books, Sausalito, CA, 1994.
2.	J. A. Cowan: Inorganic biochemistry,VCH, USA 1993.

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Curriculum course (subject) instructor:

Full prof.	**Božidar**	**Grabarić**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Chemistry and Biochemistry, Faculty of Food Technology and Biotechnology, University of Zagreb

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: Bioinorganic chemistry of elements
E-mail address: grabaric@pbf.hr
Address of personal web page:
Date of last review: July 7, 1998

CV (no more than 1200 characters):

Božidar S. Grabarić was born in Zagreb, Croatia in 1942. He received his Ph.D. in chemistry in 1973 from the Faculty of Technology, University of Zagreb, Croatia. From 1975 to 1977 he was on postdoctoral fellowship at the University of Melbourne (Australia), in 1979 at the Northwestern University (USA), in 1988 at the Las Cruces University (New Mexico, USA), and from 1993 to 1998 he was visiting professor at the Universitat de Barcelona (Spain). Now he is full professor and head of the Laboratory of General and Inorganic Chemistry and Electroanalysis at the Faculty of Food Technology and Biotechnology, University of Zagreb. He is a Deputy editor of Food Technology and Biotechnology. His research interests include electrochemical and spectroscopic methods for investigation of coordination equilibria in aqueous solutions, development and application of chemical sensors and biosensors, methods of selective molecular recognition, and chemometry.

List of relevant titles published within the last five years:

No.	Title
1.	Ivekovic D. Milardovic S. **Grabaric BS**. Palladium hexacyanoferrate hydrogel as a novel and simple enzyme immobilization matrix for amperometric biosensors. *Biosensors & Bioelectronics. 20(4):872-878, 2004*
2.	Sak-Bosnar M. Grabaric Z. **Grabaric BS**. Surfactant sensors in biotechnology part 1 - Electrochemical sensors [Review] *Food Technology & Biotechnology. 42(3):197-206, 2004*
3.	Sak-Bosnar M. Grabaric Z. **Grabaric BS**. Surfactant sensors in biotechnology part 2 - Non-electrochemical sensors [Review] *Food Technology & Biotechnology. 42(3):207-212, 2004*
4.	Matesic-Puac R. Sak-Bosnar M. Bilic M. **Grabaric BS**. New ion-pair based all-solid-state surfactant sensitive sensor for potentiometric determination of cationic surfactants. *Electroanalysis. 16(10):843-851, 2004*
5.	Rumenjak V. Milardovic S. Kruhak I. **Grabaric BS.** The study of some possible measurement errors in clinical blood electrolyte potentiometric (ISE) analysers. *Clinica Chimica Acta. 335(1-2):75-81, 2003*

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	J.-M. Díaz-Cruz, R. Tauler, **B.S. Grabarić**, M. Esteban and E. Casassas: Application of Multivariate Curve Resolution to Voltammetric Data. Part 1. Study of Zn(II) Complexation with Some Polyelectrolytes, *J. Electroanal. Chem.*, 393 (1995) 7-16.
2.	**B.S. Grabarić**, M. Tkalčec, V. Merzel, I. Filipović: Computerized Potentiometric Determination of Stability Constants of Metal Ion-Crown Complexes by the Method of Corresponding Solutions, *Electroanalysis*, 3 (1991) 647-653.
3.	I. Filipović, M. Tkalčec, **B.S. Grabarić**: On the Stability of Some Metal Ion Unsubstituted and Substituted Monocarboxylate Complexes in Aqueous Solutions, *Inorg. Chem*., 29 (1990) 1092-1097.
4.	M. Tkalčec, **B.S. Grabarić**, I. Filipović, I. Piljac: Polarographic Determination of Stability Constants and Thermodynamic Parameters of Lead(II) Propanoate and 2-Hydroxypropionate Complexes with a Computer-controlled System, *Anal. Chim. Acta*, 122 (1980) 395-402.
5.	A.M. Bond, **B.S. Grabarić** and J.J. Jackowski: Investigation of Isomerization Rates and Mechanism of Some 17- and 18-Electron Substituted Carbonyl Complexes of Chromium, Molybdenum and Tungsten Using Double Potential Step Chronoamperometry, *Inorg. Chem.*, 17 (1978) 2153-2157.

Curriculum course (subject) instructor:

Full prof.	**Zorana**	**Grabarić**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Chemistry and Biochemistry, Faculty of Food Technology and Biotechnology, University of Zagreb

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Bioinorganic chemistry of elements
E-mail address: zoranag@pbf.hr
Address of personal web page:
Date of last review: January 8, 2001

CV (no more than 1200 characters):

Zorana Grabarić was born in Zagreb, Croatia in 1942. She received her Ph.D. in chemistry in 1990 from the Faculty of Technology, University of Zagreb, Croatia. From 1975 to 1977 she was visiting scientist at the University of Melbourne (Australia), and from 1993 to 1997 at the Universitat de Barcelona (Spain). Now she is full professor in the Laboratory of General and Inorganic Chemistry and Electroanalysis at the Faculty of Food Technology and Biotechnology, University of Zagreb. Her research interests include spectroscopic methods for investigation of coordination equilibria in aqueous solutions, development and application of chemical sensors and biosensors in clinical chemistry and food analysis, mathematical methods for signal resolution, and interactions of heavy metals with biomolecules.

List of relevant titles published within the last five years:

No.	Title
1.	Sak-Bosnar M. **Grabaric Z**. Grabaric BS. Surfactant sensors in biotechnology part 1 - Electrochemical sensors [Review] *Food Technology & Biotechnology. 42(3):197-206, 2004*
2.	Sak-Bosnar M. **Grabaric Z.** Grabaric BS. Surfactant sensors in biotechnology part 2 - Non-electrochemical sensors [Review] *Food Technology & Biotechnology. 42(3):207-212, 2004*
3.	Milardovic S. **Grabaric Z.** Rumenjak V. Blau N. Milosevic D. Use of a ruthenium(III), iron(II), and nickel(II) hexacyanometallate-modified graphite electrode with immobilized oxalate oxidase for the determination of urinary oxalate. *Journal of AOAC International. 84(6):1927-1933, 2001*
4.	Milardovic S. **Grabaric Z.** Grabaric BS. Sensitive amperometric oxalate biosensor for food analysis. *Food Technology & Biotechnology. 38(3):203-210, 2000*
5.	Milardovic S. **Grabaric Z.** Tkalcec M. Rumenjak V. Determination of oxalate in urine, using an amperometric biosensor with oxalate oxidase immobilized on the surface of a chromium hexacyanoferrate-modified graphite electrode. *Journal of AOAC International. 83(5):1212-1217, 2000*

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	B. S. Grabarić, **Z. Grabarić**, J. M. Diaz-Cruz, M. Esteban and E. Casassas: "Metal Complexation Model Identification and the Detection and Elimination of Erroneus Points Using Evolving Least-Squares Fitting of Voltammetric Data", *Anal. Chim. Acta*, 363 (1998) 261-278.
2.	B. S. Grabarić, **Z. Grabarić**, R. Tauler, M. Esteban and E. Casassas: "Application of Multivariate Curve Resolution to the Voltammetric Data. Factor Analysis Ambiguities in the Study of Weak Consecutive Complexation of Metal Ion with Ligand", *Anal. Chim Acta*, 341 (1997) 105-120.
3.	N. Koprivanac, **Z. Grabarić**, S. Papić, B. S. Grabarić and G. Ačamović-Đoković: "Complexing Properties of Schiff Bases with Copper and Nickel Ions", *Monatsh. Chem*., 126 (1995) 23-34.
4.	**Z. Grabarić**, B.S. Grabarić, N. Koprivanac, I. Eškinja: Spectrophotometric Investigation of 2-(2-Pyridylmethyleneamino)phenol Complexes with Cobalt(II) and Nickel(II) in Methanol-Water Solutions, *Chem. Papers*, 47 (1993) 282-287.
5.	A. M. Bond, B. S. Grabarić and **Z. Grabarić**: "Kinetic and Thermodynamic Study of Reactions of Some Substituted Manganese(I) and Manganese(II) Tricarbonyl Complexes Using Spectrophotometric and Electrochemical Techniques", *Inorg. Chem*., 17 (1978) 1013-1018.

I. BASIC DATA ON PROPOSED MODULE

Name of module: **THE PEPTIDOMIMETICS AND PSEUDOPEPTIDES**

Core course of studies for module: **BIOTECHNOLOGY**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): **2./III.**

Module status: Ground, ElectiveA, Elective B **Elective B**

Language: English

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full Professor	**Vladimir**	**Rapić**
Scientific-educational title	name	surname

Number of ECTS points 3

Total number of contact hours: 39

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	15
	Auditory Practice	
	Laboratory Practice	20
	Practicum	
	Seminar	4
	Field Work	

Requirements for signature to be appended

Attending lectures and seminars and efficiently completed laboratory practices.

Manner in which examination is taken: Written [ ] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

In the introduction definition and role of natural protein mimetics as models for protein studies are elaborated. Thereafter overview of peptide mimetics described in literature with emphasis on their biological activity is given. In continuation pseudopeptides which can serve as appropriate molecules for therapeuthic and similar purposes (in comparation with proteins which underwant to proteolysis, hardly pass across a cell membrane and, etc.) are elaborated. Thereby overview of pseudopeptides emphasizing their biological activity is given. Spectroscopic methods (IR, ^{1}H-NMR, CD) for identification of inter- and intramolecular hydrogen bonds and chirality of peptidomimetics and pseudopeptides identification are elaborated as well.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

The issues which enable students to recognize new methods for researche of proteins and pseudopeptides which are important for biotechnology, pharmacology and biomedicine are given.

Literature (list should include details on publisher and year of publication):
Compulsory literature

No.	Title
1.	S. Kee et al.: Design **of beta-turn based therapeutic agents**, *Current Pharmaceutical Design*. **9** (2003)1209.
2.	J. A. Patch et al.: **Mimicry of bioactive peptides via non-natural, sequence-specific peptidomimetic oligomers**, *Current Opinion in Chemical Biology* **6** (2002) 872.
3.	M. A. Johnson et al.: **Molecular mimicry of carbohydrates by peptides**, *Australian Journal of Chemistry* 55 (2002) 13.
4.	C. Adessi et al.: **Converting a peptide into a drug: Strategies to improve stability and bioavailability**, *Current Medicinal Chemistry* **9** (2002) 963.
5.	V. Apostolopoulos et al.: **Applications of peptide mimetics in cancer**, *Current Medicinal Chemistry* **9** (2002) 411.

Recommended literature

No.	Title
1.	M. North: **Incorporation of Conformationally Constrained β-Amino Acids into Peptides**, *Journal of Peptide Science* **6** (2000) 301.

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION
Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full Professor	**Vladimir**	**Rapić**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor	Faculty of Food technology and Biotechnology, Department of Chemistry and Biochemistry

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:	**The peptidomimetics and pseudopeptides**
E-mail address:	vrapic@pbf.hr
Address of personal web page:	
Date of last review:	March 3th, 1999 Full Professor
CV (no more than 1200 characters):	I was born on April 7th, 1941 in Zagreb, where I finished a high school. In 1964 I graduated on the Faculty of Technology in Zagreb. In 1967 I completed the postgraduate study, "Organic chemistry and biochemistry" course, on the Faculty of Science in Zagreb. I defended my doctoral dissertation on the Faculty of Technology in 1971. I spent the academic year 1973/74. on the post-doctoral specialization at the Organisch-chemisches Institut der Universität Wien. I became employed in 1964 as assistant at the Faculty of Technology, Laboratory of Organic chemistry. I was appointed assistant professor in 1973, I became associate professor in 1979, and was appointed full professor in 1985. I held courses on post-graduate studies at The Faculty of Food and Biotechnology and Faculty of Science. I have so far been a supervisor of a number of graduation theses, as well as a mentor of 8 dissertations and 12 post-graduate theses. I took part in the Croatian translation and was the editor-in-chief of *IUPAC Nomenclature of organic compounds* and wrote a manual V. Rapić: *Nomenclature of organic compounds*, Zagreb, ŠK, 1991 and 1995. Together with I. Bregovac I translated the book H. S. Pine *Organic chemistry*, ŠK, 1994, and wrote a handbook *Methods of preparation and isolation of organic compounds*, ŠK, 1994. I am the author of 50 *CC*-scientific papers, 5 other scientific publications and a few professional papers and studies.

List of relevant titles published within the last five years:

No.	Title
1.	L. Barišić, V. Rapić, V. Kovač, **Ferrocene Compounds. XXIX. Efficient Syntheses of 1'-Aminoferrocene-1-carboxylic Acid Derivatives,** *Croat Chem. Acta* **75** (1) (2002) 199-210.
2.	S. Đaković, J. Lapić, V. Rapić, **Ferrocene Compounds. XXXVI. Lipase-catalyzed Enantioselective Acetylation of Prochiral 2-(ω-Ferrocenylalkyl)propane-1,3-diols**, *Biocatalysis and Biotransformation*, **21** (6) (2003) 291-295.
3.	S. Đaković, J. Lapić, V. Rapić, **Ferrocene Compounds. XXXVI. Lipase-catalyzed Enantioselective Acetylation of Prochiral 2-(ω-Ferrocenylalkyl)propane-1,3-diols**, *Biocatalysis and Biotransformation*, **21** (6) (2003) 291-295.
4.	V. Kovač, A. Višnjevac, V. Rapić, B. Kojić-Prodić, **Ferrocene Compounds. XL. Synthesis and characterization of ferrocene Schiff bases**, *J. Molecular Structure* **687** (2004) 107-110.
5.	L. Barišić, M. Dropučić, V. Rapić, H. Pritzkow, S. I. Kirin, N. Metzler-Nolte, **The first oligopeptide derivative of 1'-aminoferrocene-1-carboxylic acid shows helical chirality with antiparallel strands,** *Chem. Commun.* **17** (2004) 2004-2005.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	S. H. Pine, **Organic chemistry** (Croatian translation I. Bregovec and V. Rapić) chapter **Spectroscopic methods** pp. 1062-1138, Zagreb, Školska knjiga, 1994.
2.	V. Rapić, **Methods of preparation and isolation of organic compounds** (in Croatian), Školska knjiga, Zagreb, 1994.
3.	V. Rapić, **Nomenclature of organic compunds** (in Croatian) Školska knjiga, 3th modified and supplemented edition, Zagreb, 2004.
4.	**Guide to IUPAC nomenclature of organic compounds** (in Croatian), HKD and HDKI Recommendations 2001 (editor of the Croatian translation: V. Rapić; translation: I. Bregovec, Š. Horvat, K. Majerski, V. Rapić), Školska knjiga, Zagreb, 2002.
5.	Scientific Project (Principal investigator V. Rapić): **Synthesis and Properties of Metallocenes and Heterocycles** (0058023) 2002.

I. BASIC DATA ON PROPOSED MODULE

Name of module: **BIODEGRADATION OF ORGANIC COMPOUNDS**

Core course of studies for module: **BIOTECHNOLOGY**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): _____

Module status: Ground, ElectiveA, Elective B — Elective B

Language: english

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

assistant professor	**Tibela**	**Landeka Dragičević**
Scientific-educational title	name	surname

Number of ECTS points: 3

Total number of contact hours: 35

Manner in which direct instruction is conducted:

Types of instruction		hours
symbol	title	
	Lectures	20
	Auditory Practice	
	Laboratory Practice	7
	Practicum	
	Seminar	8
	Field Work	

Requirements for signature to be appended

Attendance of lectures, seminars and laboratory practice and seminar work.

Manner in which examination is taken: Written [ ] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Microorganisms and their role in cycles of biogenic elements in the biosphere. Organic ingredients and their properties (mutagenicity, teratogenicity and carcinogenicity), stability and resistance to microbial degradation. Legislation. Basic metabolic pathways of xenobiotics degradation. Microbial degradation of pesticides, dyes, formaldehyde, naphthalene, phenol, halogenated aliphatic and aromatic carbohydrates, oil, wastewater and wastes. Method of bioaugmentation. New microbial species in degradation of organic substances. New monitoring methods for environmental impurities. The role of genetically modified organisms in degradation of organic substances.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

In addition to basic facts, the students are introduced with the role of microorganisms in degradation of organic compounds.

Literature (list should include details on publisher and year of publication):
Compulsory literature

No.	Title
1.	«Microbial Transformation and Degradation of Toxic Organic Chemicals», (Eds. L.Y. Young and C.E. Cerniglia), John Wiley and Sons Inc., New York, 1995.
2.	Environmental Biotechnology – Reducing Risks from Environmental Chemicals through Biotechnology», (Ed. G.S. Omenn), Plenum Press, New York, 1988.
3.	
4.	
5.	

Recommended literature

No.	Title
1.	F.C. Miller «Biological Degradation of Wastes», (Ed. A.M. Martin), Elsevier Applied Science, London, New York, 1991.
2.	J.B. Snape, I.J. Dunn, J. Ingham, J.E. Přenosil «Dinamics of Environmental Bioprocess. Modeling and Simulation», (Eds. K. Sora and J. Gardiner), VCH Verlagsgesellcschaft mbH, Weinheim, VCH Publishers Inc., New York, 1995.
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

assistant professor	Tibela	Landeka Dragičević
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Food Technology Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: Coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: Lectures, seminars and practice

E-mail address: tdragic@pbf.hr

Address of personal web page:

Date of last review: 13.02. 2002

CV (no more than 1200 characters): Tibela Landeka Dragičević born in Vinkovici on 1 November 1967. Graduated from primary and secondary school in Vinkovci and from the Faculty of Food Technology, University of Osijek (1990). Began post-graduate studies, course biochemical engineering, at the Faculty of Food Technology and Biotechnology, University of Zagreb (1990) wherefrom she took her MSc in 1993 and PhD in 1995 (biotechnical sciences). Her scientific-research work relates to microbial ecology. She has had vocational trainings in the treatment of wastewater on in several countries (Croatia, Czech Republic, Slovenia and Austria). She has been actively engaged in realization of several national scientific projects and the international FP6 "SARIB-project". She is the mentor of several BSc and one MSc work. Since 1991 she works at the Faculty of Food Technology and Biotechnology. Since 2002 she is assistant professor.

List of relevant titles published within the last five years:

red. broj	Naziv
1.	Landeka Dragičević, T., Zanoški, M., Glancer-Šoljan, M., Šoljan, V., Matić, V., Krajina , J. (2004) Activity of the granulated biomass of the mixed microbial culture for highly efficient carbon and nitrogen removal in the process wastewater. Proceedings of the European Symposium on Environmental Biotechnology, ESEB 2004, (Ed. W. Verstraete), 25-28 April 2004, Oostende, Belgium, 645-648.
2.	Čačić, Lj., Šoljan, V., Dragičević, T.L., Glancer-Šoljan, M., Vuksan, B., Krivohlavek, A. (2002) The removal of nitrogen substances from a chemically defined medium by the addition of liner alkylbenzene sulfonate (LAS using a mixed bacterial culture of nitrificants and denitrificants. Limnological reports. Proceedings of the 34th Conference in Tulcea, August 2002 (Eds. G. Brezeanu, R. Stiuca), Tulcea, Romania, Vol. **34**, 21-30.
3.	Glancer-Šoljan, M., Ban, S., Landeka Dragičević, T., Šoljan, V., Matić, V. (2001) Granulated mixed microbial culture suggesting successful employment of bioaugmentation in the treatment of process wastewater. *Chem.Biochem.Eng.Q.* **15** (3), 87-94.
4.	Glancer-Šoljan, M., Šoljan, V., Landeka Dragičević, T., Čačić. Lj. (2001) Aerobic degradation of formaldehyde in wastewater from the production of melamine resins. *Food technol. biotechnol.* **39** (3), 197-202.
5.	

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Presently, coordinator of two undergraduate courses at the Zagreb university
2.	Mentor of one Mr. Thesis and a few diploma theses
3.	Co-author of course material "Biološka obradba otpadnih voda" (2002), Ed. Kugler, Zagreb
4.	Scientific competence – investigator on four scientific projects (one international)
5.	Several public lectures at home and aboard

Curriculum course (subject) instructor:

full professor	Margareta	Glancer-Šoljan
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Food Technology Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Lectures and seminars

E-mail address: mglancer@pbf.hr

Address of personal web page:

Date of last review: 12.01.1999.

CV (no more than 1200 characters):

Margareta Glancer-Šoljan, born in Teslić (Bosnia and Herzegovina) in 1944 where she graduated from the primary school and secondary technical school (chemistry). Took BSc from the Faculty of Technology in Tuzla (1971). Post-graduate studies in chemical engineering began at the Faculty of Technology in Zagreb (1973) where she took her MSc and PhD in process engineering (1976 and 1977 respectively). Years 1978 and 1979 spent at the Massacussets Institute of Technology (MIT) Cambridge, USA. From 1971 worked as technical associate at Department of Biotechnology, Faculty of Technology in Zagreb. In 1973 elected at the same Faculty for an assistant professor and in 1979 for a associated professor. In 1986 became a professor at the Faculty of Food Technology and Biotechnology, University of Zagreb (graduate and post-graduate studies in the treatment of wastewater and waste materials). Mentored over 80 MSc and 8 PhD theses. Leader of five national and two international scientific projects. Awarded «Nikola Tesla» and «Kliment Ohridski» awards (1988, IFIA 1995 and ARCA 2003). Published over 60 scientific works.

List of relevant titles published within the last five years:

No.	Title
1.	Landeka Dragičević, T., Zanoški, M., Glancer-Šoljan, M., Šoljan, V., Matić, V., Krajina , J. (2004) Activity of the granulated biomass of the mixed microbial culture for highly efficient carbon and nitrogen removal in the process wastewater. Proceedings of the European Symposium on Environmental Biotechnology, ESEB 2004, (Ed. W. Verstraete), 25-28 April 2004, Oostende, Belgium, 645-648.
2.	Čačić, Lj., Šoljan, V., Dragičević, T.L., Glancer-Šoljan, M., Vuksan, B., Krivohlavek, A. (2002) The removal of nitrogen substances from a chemically defined medium by the addition of liner alkylbenzene sulfonate (LAS) using a mixed bacterial culture of nitrificants and denitrificants. Limnological reports. Proceedings of the 34th Conference in Tulcea, August 2002 (Eds. G. Brezeanu, R. Stiuca), Tulcea, Romania, Vol. **34**, 21-30.
3.	Glancer-Šoljan, M., Ban, S., Landeka Dragičević, T., Šoljan, V., Matić, V. (2001) Granulated mixed microbial culture suggesting successful employment of bioaugmentation in the treatment of process wastewater. *Chem.Biochem.Eng.Q.* **15** (3), 87-94.
4.	Glancer-Šoljan, M., Šoljan, V., Landeka Dragičević, T., Čačić. Lj. (2001) Aerobic degradation of formaldehyde in wastewater from the production of melamine resins. *Food technol. biotechnol.* **39** (3), 197-202.
5.	

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Glancer-Šoljan, M., Landeka Dragičević, T., Šoljan, V., Ban, S. (2002) Biološka obradba otpadnih voda. Course material. Ed. Kugler, Zagreb.
2.	Glancer-Šoljan, M. (1993) New technologies for biological treatment of municipal and industrial waste waters by using suitable microorganisms as starter culture. *Kem. Ind*. **42** (9), 323-330.
3.	Landeka, T., Šoljan, V., Glancer, M. (1993) Razgradnja tiocijanata odabranim sojevima bakterija i združenim mješovitim kulturama. *Prehrambeno-tehnol. botehnol. rev.* **31** (4),137-143.
4.	Dvoraček, L., Glancer, M., Ban, S. (1989) Degradation of phenol in industrial waste waters. Part I: Selection of microorganisms. *Prehrambeno-tehnološka i biotehološka revija* **27** (2-3), 147-154.
5.	Glancer-Šoljan, M., Ban, S.N., Dvoraček, L. (1985) Biodegradacija betaina pomoću kvasca *Trichosporon* i mješovite kulture aktivnog mulja. *Prehrambeno-tehnološka revija,* **7** (1-2), 3-10.

I. BASIC DATA ON PROPOSED MODULE

Name of module: **LIPASE-CATALYSED PREPARATION OF CHIRAL COMPOUNDS**

Core course of studies for module: **BIOTECHNOLOGY**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): **2 (III)**

Module status: Ground, ElectiveA, Elective B: Elective B

Language: English

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Assistant Professor (Review in April 2005)	**Senka**	**Djaković**
Scientific-educational title	name	surname

Number of ECTS points: 3

Total number of contact hours: 39

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	15
	Auditory Practice	
	Laboratory Practice	20
	Practicum	
	Seminar	4
	Field Work	

Requirements for signature to be appended

Attending lectures and seminars and efficiently completed laboratory practices.

Manner in which examination is taken: Written [ ] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Biocatalytic transformations found very wide application for preparation of chiral compounds because they possess high regio - and stereoselectivity. Activities of enzymes in organic solvents open a new area in bioorganic chemistry. Microbial and fungal lipases which exhibit high selectivity towards a broad range of substrates and very good stereoselectivity belong to the most available enzymes for various types of transformations. Enantioselective synthesis of alcohols, diols, poliols and amines, synthesis of amides and peptides, transesterifications of lipides, diastereoselective esterifications or hydrolysis, acylation and deacylation under the mild reaction conditions occured in such transformations with high stereoselectivity. The optically pure compounds obtained are used as chiral sintons in synthesis of bioactive or important industrial compounds used in pharmacy, biotechnology, food industry and agriculture.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

The module includes fundamental knowledge about biocatalytic preparation of chiral compounds which are important for the title studies.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	M. Nógrádi, **Stereochemistry**, Akadémiai Kiadó, Budapest, 1981.
2.	L. Poppe, L Novák, **Selective Biocatalysis**, Wiley-VCH, Weinheim, New York, Cambridge, Basel, 1992.
3.	K. Faber, **Biotransformations in Organic Chemistry**, Springer-Verlag Berlin Heidelberg New York, 1997.
4.	
5.	

Recommended literature

No.	Title
1.	K. Drauz, H. Waldmann, **Enzyme Catalysis in Organic Synthesis**, Wiley-VCH, Weinheim, New York, Cambridge, Tokyo, 1995.
2.	U. T. Bornscheuer, R. J. Kazalauskas, **Hydrolases in Organic Synthesis**, Wiley-VCH, Weinheim, New York, Chichester, Brisbone, Singapore, Toronto, 1999.
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Assistant Professor (Review in April 2005)	**Senka**	**Djaković**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor	Faculty of Food Technology and Biotechnology, Department of Chemistry and Biochemistry

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:	Lipase-Catalysed Preparation of Chiral Compounds (Stereoselective transformations – application, resolution of racemates - GC, HPLC, crystallization)
E-mail address:	sdjakov@pbf.hr
Address of personal web page:	
Date of last review:	april 2005.
CV (no more than 1200 characters):	I was born on April 4, 1966 in Vinkovci where I finished my elementary school. *Secondary school*: Chemical School (Ruđer Bošković), Osijek, where I completed 1984. *Graduate studies*: Faculty of science, University of Zagreb, graduated 1991. Diploma Thesis: Preparation of Prochiral Precursors of S-(-)-3-(3-hidroxyphenyl)-1-propylpiperidine (3-PPP) (Supervisor: Prof. Dr. Sc. Vitomir Šunjić). *Postgraduate studies*: Faculty of science, University of Zagreb, Master of Science, Scientific field: chemistry (organic chemistry), where I win master's degree 20. 10. 1994. Master Thesis: Preparation of Some Chiral Nitrogen Ligands and Catalytic Activity of Their Metal Complexes (Supervisor: Dr. Sc. Zlata Raza). *Doctor's studies*: Faculty of science, University of Zagreb, Doctor of science, Scientific field: chemistry (organic chemistry), where I took doctor's degree 14. 07. 2000. Doctoral Thesis: Preparation and Lipase Catalyzed Stereoselective Acylation of Ferrocene Aliphatic and Aromatic Diols (Supervisor: Prof. Dr. Sc. Vladimir Rapić). I got *DAAD-Scholarship* for postdoctoral studies on University of Ulm, Germany, 2003, where I have been 3 months. I published 8 scientific paper in journal indexed in *CC*, and 3 scientific paper in journal indexed in secondary publications.

List of relevant titles published within the last five years:

No.	Title
1.	S. Đaković, J. Lapić, V. Rapić, **Ferrocene Compounds. XXXVI. Lipase-catalyzed Enantioselective Acetylation of Prochiral 2-(ω-Ferrocenylalkyl)propane-1,3-diols**, *Biocatalysis and Biotransformation*, **21** (6) (2003) 291-295.
2.	M. Cetina, S. Đaković, V. Rapić, A. Golobič, **Ferrocene Compounds. XXXIX. 1-Ferrocenylisochromane** *Acta Cryst.* **C59** (2003) m328-m330.
3.	M. Cetina, S. Đaković, A. Hergold-Brundić, V. Rapić, **1'-(1-Hydroxyethyl)-*N,N*-diphenylferrocene-1-carboxamide** *Acta Cryst.* ***E*** **E61** (2005) m307-m310.
4.	S. Govori, V. Kaljaj, V. Rapić, L. Kaljaj, S. Đaković, **Synthesis and Structure of Some 3,4-Annelated Coumarin Systems**, *Heterocyclic Communications* **8** (2002) 129S.
5.	

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Incentive Project for Young Researchers No. 058006: "**Preparation and Biocatalysis of Ferrocenic Compounds**", 1997-2000.
2.	Petar Horvat, **Preparation and Lipase-Catalyzed O-Acetilation of Ferrocene Alcohols**, 2004., Diploma Work.
3.	Danijela Marincel, **Preparation of Some Ferrocene Ketoacids and Lactons**, 1997., Diploma Work
4.	Branka Abramović, **Preparation of Aliphatic and Aromatic Ferrocene Diols**, 1999., Diploma Work
5.	

Curriculum course (subject) instructor:

Full Professor	Vladimir	Rapić
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Faculty of Food technology and Biotechnology, Department of Chemistry and Biochemistry

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Lipase-Catalysed Preparation of Chiral Compounds (Stereoselective transformations – Introduction)

E-mail address: vrapic@pbf.hr

Address of personal web page:

Date of last review: March 3th, 1999 Full Professor

CV (no more than 1200 characters):

I was born on April 7th, 1941 in Zagreb, where I finished a high school. In 1964 I graduated on the Faculty of Technology in Zagreb. In 1967 I completed the postgraduate study, "Organic chemistry and biochemistry" course, on the Faculty of Science in Zagreb. I defended my doctoral dissertation on the Faculty of Technology in 1971. I spent the academic year 1973/74. on the post-doctoral specialization at the Organisch-chemisches Institut der Universität Wien. I became employed in 1964 as assistant at the Faculty of Technology, Laboratory of Organic chemistry. I was appointed assistant professor in 1973, I became associate professor in 1979, and was appointed full professor in 1985. I held courses on post-graduate studies at The Faculty of Food and Biotechnology and Faculty of Science. I have so far been a supervisor of a number of graduation theses, as well as a mentor of 8 dissertations and 12 post-graduate theses. I took part in the Croatian translation and was the editor-in-chief of *IUPAC Nomenclature of organic compounds* and wrote a manual V. Rapić: *Nomenclature of organic compounds*, Zagreb, ŠK, 1991 and 1995. Together with I. Bregovac I translated the book H. S. Pine *Organic chemistry*, ŠK, 1994, and wrote a handbook *Methods of preparation and isolation of organic compounds*, ŠK, 1994. I am the author of 50 *CC*-scientific papers, 5 other scientific publications and a few professional papers and studies.

List of relevant titles published within the last five years:

No.	Title
1.	L. Barišić, V. Rapić, V. Kovač, **Ferrocene Compounds. XXIX. Efficient Syntheses of 1'-Aminoferrocene-1-carboxylic Acid Derivatives,** *Croat Chem. Acta* **75** (1) (2002) 199-210.
2.	S. Đaković, J. Lapić, V. Rapić, **Ferrocene Compounds. XXXVI. Lipase-catalyzed Enantioselective Acetylation of Prochiral 2-(ω-Ferrocenylalkyl)propane-1,3-diols**, *Biocatalysis and Biotransformation*, **21** (6) (2003) 291-295.
3.	S. Đaković, J. Lapić, V. Rapić, **Ferrocene Compounds. XXXVI. Lipase-catalyzed Enantioselective Acetylation of Prochiral 2-(ω-Ferrocenylalkyl)propane-1,3-diols**, *Biocatalysis and Biotransformation*, **21** (6) (2003) 291-295.
4.	V. Kovač, A. Višnjevac, V. Rapić, B. Kojić-Prodić, **Ferrocene Compounds. XL. Synthesis and characterization of ferrocene Schiff bases**, *J. Molecular Structure* **687** (2004) 107-110.
5.	L. Barišić, M. Dropučić, V. Rapić, H. Pritzkow, S. I. Kirin, N. Metzler-Nolte, **The first oligopeptide derivative of 1'-aminoferrocene-1-carboxylic acid shows helical chirality with antiparallel strands,** *Chem. Commun.* **17** (2004) 2004-2005.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	S. H. Pine, **Organic chemistry** (Croatian translation I. Bregovec and V. Rapić) chapter **Spectroscopic methods** pp. 1062-1138, Zagreb, Školska knjiga, 1994.
2.	V. Rapić, **Methods of preparation and isolation of organic compounds** (in Croatian), Školska knjiga, Zagreb, 1994.
3.	V. Rapić, **Nomenclature of organic compunds** (in Croatian) Školska knjiga, 3th modified and supplemented edition, Zagreb, 2004.
4.	**Guide to IUPAC nomenclature of organic compounds** (in Croatian), HKD and HDKI Recommendations 2001 (editor of the Croatian translation: V. Rapić; translation: I. Bregovec, Š. Horvat, K. Majerski, V. Rapić), Školska knjiga, Zagreb, 2002.
5.	Scientific Project (Principal investigator V. Rapić): **Synthesis and Properties of Metallocenes and Heterocycles** (0058023) 2002.

I. BASIC DATA ON PROPOSED MODULE

Name of module: **PROGRAMMING IN BIOINFORMATICS**

Core course of studies for module: **BIOTECHNOLOGY**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): **2. (III)**

Module status: Ground, Elective A, Elective B **Elective B**

Language: English
Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Professor	**Daslav**	**Hranueli**
Scientific-educational title	name	surname

Number of ECTS points 2
Total number of contact hours: 25

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	10
	Auditory Practice	
	Laboratory Practice	
	Practicum	10
	Seminar	5
	Field Work	

Requirements for signature to be appended

Presence at lectures, practicum and seminars

Manner in which examination is taken: Written [X] Oral [ ] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Programming skills are now in strong demand in biology research and are an important new laboratory skill. The Perl (BioPerl) language makes it possible to start writing real programs quickly. The language includes a collection of "protocols", or programming techniques, which can be useful in bioinformatics. There are certain operations with DNA and protein sequences and also protocols with which DNA can be translated into proteins. The essence of bioinformatics is dealing with large quantities of information. Because of that it is necessary to build biological databases. Biological databases allow the organisation of data, completeness and integrity, transformation from one form to another and efficient search through the data to find the desired information. The MySQL database is the world's most popular, and some might argue, the best open source database. One can interface with MySQL using most popular programming languages, including PHP and Perl. The SQL language is the universally accepted mechanism for accessing and manipulating data stored in a relational database. It is a text-based language where instead of the mathematical notations there are words from the English language.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Writing algorithms and programs to solve biological problems. Building biological databases. Using their operations and connections with program languages like PHP, Perl and SQL.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	Beginig Perl for Bioinformatics, James Tisdall, O'Reilly & Associates, Inc.
2.	MySQL Visual QuickStart Guide, Larry Ullman, PeachPit Press
3.	
4.	
5.	

Recommended literature

No.	Title
1.	MySQL: The World's Most Popular Open Source Database http://www.mysql.com/
2.	The Bioperl Project http://bioperl.org/
3.	
4.	
5.	

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Professor	Daslav	Hranueli
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor	Faculty of Food Technology and Biotechnology Department of Biochemical Engineering

FTB employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:	Biology and computer science; Programming techniques for biological databases using EMBL and UniProt; Programming techniques for biological databases using EMBL and UniProt; programming using BLAST
E-mail address:	dhranueli@pbf.hr
Address of personal web page:	http://www.pbf.hr/bioinformatics/
Date of last review:	January 13, 2004
CV (no more than 1200 characters):	Prof. Daslav Hranueli was born on April 3, 1947 in Zagreb. He got his Ph.D. at the Faculty of Food Technology and Biotechnology, University of Zagreb, in 1979 and became a Full Professor in 1999. He worked in the Research Institute of PLIVA Inc. from 1971 to 2002 first as the Research scientist and then as the Assistant to the Research Director. From April 2002, he started working at the Faculty of Food Technology and Biotechnology as a Head of the Section for bioinformatics, teaching "Basic bioinformatics", "Molecular genetics of antibiotic biosynthesis" and "Bioinformatics of industrial microorganisms". Until now he has published 7 chapters in Scientific books and Textbooks, 20 papers in CC Journals, 12 papers in Journals referred in other databases and 14 papers in Proceedings (53 titles in total), 24 of which have been cited in SCI more than 340 times. His applied research has lead to one technical and technological document for the investment in the production line for the liquid enzyme production in industrial fermentation plant, one new product, 3 novel industrial strains and 2 patents.

List of relevant titles published within the last five years:

No.	Title
1.	Petković, H., **D. Hranueli**, P. Raspor & I.S. Hunter. The use of molecular biology to reprogram *Streptomyces* to make polyketide antibiotics more efficiently, and create novel secondary metabolites. *Pflügers Arch. - Eur. J. Physiol.*, **439**, R87-R89, 2000.
2.	**Hranueli, D**., N. Perić, B. Borovička, S. Bogdan, J. Cullum, P.G. Waterman & I. Hunter. Molecular biology of polyketide biosynthesis. *Food Technol. Biotechnol.*, **39**, 203-213, 2001.
3.	**Hranueli, D**. & J. Cullum. From genes to genomes and beyond, pp. 278-284. ***In:*** Lelas, V. *et al*. (eds.), *Proceedings of the 4th Croatian Congress of Food Technologists, Biotechnologists and Nutritionists (Central European Meeting)*, Zagreb, 2002.
4.	Denapaite, D., A. Paravić Radičević, B. Čajavec, I.S. Hunter, **D. Hranueli** & J. Cullum. Persistence of the chromosome end regions at low copy number in mutant strains of *Streptomyces rimosus* and *Streptomyces lividans*. *Food Technol. Biotechnol*., ***43***, 9-17, 2005.
5.	**Hranueli, D**., J. Cullum, B. Basrak, P. Goldstein & P.F. Long. Stability of the *Streptomyces* genome - evolution and engineering of new antibiotics. *Current Medicinal Chemistry*, ***5*** (3), 2005. (in press)

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Cullum, J., L.-I. Horvat, **D. Hranueli** & K. Wolf. The use of bioinformatics in bacterial genetics, pp. 285-290. ***In:*** Lelas, V. *et al*. (eds.), *Proceedings of the 4th Croatian Congress of Food Technologists, Biotechnologists and Nutritionists (Central European Meeting),* Zagreb, 2002.
2.	**Hranueli, D**. New technological, economic and social challenges. *Perspectives, PLIVA Global Review,* **1**, 6-9, 2002.
3.	**Hranueli, D**. Where functional genomics can be applied. *Perspectives, PLIVA Global Review,* **1**, 28-33, 2002.
4.	**Hranueli, D**. & J. Cullum. Bioinformatics of *Streptomycs* species and food production, pp. 333-340. ***In:*** Kniewald, Z. *et al*. (eds.), *Current Studies of Biotechnology - Vol. III. Food*. Croatian Society of Biotechnology, Zagreb, 2003.
5.	**Hranueli, D**. Industrial Applications of Genomics, Proteomics and Bioinformatics. ***In:*** Moss, D.S., S. Jelaska & S. Pongor (eds.), *Essays in Bioinformatics*. IOS Press, Amsterdam, 2005. (in press)

Curriculum course (subject) instructor:

Senior Assistant	Ana	Vukelić
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Faculty of Food Technology and Biotechnology, Department of processing engineering

FTB employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: 2/3 teaching units of lectures, practicum and seminars of the module Programming in bioinformatics

E-mail address: avukelic@pbf.hr

Address of personal web page: http://www.pbf.hr/bioinformatics/

Date of last review: Promotion into Assistant professor is expected during 2005

CV (no more than 1200 characters):

Ana Vukelić, Ph.D. was born on August 17, 1973 in Skopje, Macedonia. She got her B.Sc. in 1997 (study of applied mathematics and informatics), M.Sc. in 2000 and Ph.D. in 2003 at the PMF - Mathematics department, University of Zagreb. She worked in the University Computing Centre (SRCE) from 2000 to 2001 at the position of computing engineer. From February 2001, she started working at the Faculty of Food Technology and Biotechnology in the Section for mathematics as an assistant researcher on the project "Inequalities and applications". She became a senior assistant in 2003 and she teaches "Mathematics 1", "Mathematics 2", "Numerical methods" and "Basic bioinformatics". She also takes a part in creating and updating the web site of the faculty, the Section for mathematics and the Section for bioinformatics. She also administer the server of the Section for bioinformatics. Until now she has published 2 chapters in Scientific books, 5 papers in CC Journals, 2 papers in SCI Journals, 8 papers in Journals referred by *Mathematical* Reviews and 2 papers in Proceedings. She also has 14 professional papers.

List of relevant titles published within the last five years:

No.	Title
1.	Lj. Dedić, M. Matić, J. Pečarić, **A. Vukelić**, *On generalizations of Ostrowski inequality via Euler harmonic identities*. J. of Inequal. & Appl., **7** (6) (2002), 787-805.
2.	J. Pečarić, I. Perić, **A. Vukelić**, *On Euler-Boole formulae,* Math. Ineq. Appl., **7** (1) (2004), 27-46.
3.	J. Pečarić, I. Perić, **A. Vukelić**, *Sharp integral inequalities based on general Euler two-point formulae,* ANZIAM J., **46** (2005), 1-20.
4.	A. Aglić Aljinović, J. Pečarić, **A. Vukelić**, *The extension of Montgomery identity via Fink identity with applications*. J. Inequal. and Appl., **2005** (1) (2005), 67-80.
5.	J. Pečarić, **A. Vukelić**, *Milovanović-Pečarić-Fink inequality for difference of two integral means*. Taiwanese Journal of Mathematics, (2005) (in press)

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	**A. Vukelić**, *Stationary Stokes system for quasi-Newtonian fluids*, pp. 433-438. ***In*:** Proceedings of 23rd Int. Conf. Information Technology Interfaces, Pula, 2001.
2.	J. Pečarić, **A. Vukelić**, *On generalizations of Dragomir-Agarwal inequality via some Euler-type identities*. Mat. Bilten., **26** (LII) (2002), 17-42.
3.	J. Pečarić, I. Perić, **A. Vukelić**, *Estimations of the difference of two integral means via Euler-type identities*. Math. Ineq. Appl., **7** (3) (2004), 365-378.
4.	**A. Vukelić**, *Note on Dragomir-Agarwal inequalities, the general Euler two-point formulae and convex functions*. J. Inequal. Pure and Appl. Math., **6** (1) (2005), Article 19.
5.	M. Matić, J. Pečarić**, A. Vukelić**, *On generalization of Bullen-Simpson's 3/8 inequality*. Mathematical and Computer Modelling, (2005) (in press)

I. BASIC DATA ON PROPOSED MODULE

Name of module: **MODIFIED FATS AND OILS**

Core course of studies for module: **FOOD ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): 2. (III/IV)

Module status: Ground, ElectiveA, Elective B: Elective B

Language: English

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full professor	**Dubravka**	**Štrucelj**
Scientific-educational title	name	surname

Number of ECTS points: 3

Total number of contact hours: 35

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	20
	Auditory Practice	
	Laboratory Practice	10
	Practicum	
	Seminar	5
	Field Work	

Requirements for signature to be appended

Laboratory practice reports and seminar work

Manner in which examination is taken: Written [X] Oral [ ] Append X in the appropriate box

Description of module (in no more than 1200 characters):

Lectures

Comparison of technological procedures for fat modification: fractionation, directed and random interesterification, hydrogenation, combination of procedures. Fat crystalization and the importance of polymorphism and triglyceride composition. Consistency. Shortenings: definition, principles of classification; oil blends – plastic, fluid and powdered shortenings. Bakery shortenings. Frying shortenings. Cocoa butter substitutes and equivalents. Margarine and related products: historical and recent trends. Legislation. MCT- oils, olestra, multifunctional oils. Role of these fats in nutrition.

Laboratory Practice

Phisical properties of solid fats of special purpose.

Seminar

Balance of selected fats – shortenings production.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

Getting acquainted with technological processes of production of solid fats and oils of special purpose and conditions of their application in different kinds of food, and their role in nutrition of specific consumers' categories.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	T.H.Applewhite, Bailey's Industrial Oil and Fat Products Vol.3., Wiley-Interscience Publ. New York-Chicester-Brisbane-Toronto, 1985.
2.	D.R. Erickson, Practical Handbook of Soybean Processing and Utilization, AOCS Press, Champaign, Illinois. 1995.

Recommended literature

No.	Title
1.	H.E. Snyder, T.W. Kwon, Soybean Utilization, Van Nostrand Reinhold Co., New York, 1987.

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full professor	**Dubravka**	**Štrucelj**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of food engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:	**MODIFIED FATS AND OILS**
E-mail address:	dstruc@pbf.hr
Address of personal web page:	-
Date of last review:	July 14th, 1998
CV (no more than 1200 characters):	Born on March, 28th, 1940 in Zagreb. After gymnasium in 1958. she entered Department of Biotechnology on Technological Faculty in Zagreb where she graduated in 1963 and was employed as B.S. assistant in Laboratory for oil and fat technology. She got the academic title doctor of biotechnical science in 1981. She was elected to assistant professor in 1982, associate professor in 1990 and full professor in 1998. She is in charge of subjects Lipid chemistry and technology, Food engineering II and Raw material in food industry, and some subjects in postgraduate study. She supervised over 50 diploma works, 14 master theses and 3 dissertations. 1989-1991 she participated in teaching on Agricultural Faculty in Sarajevo and 2000-2004 on Faculty of Chemical Technology in Split. In 1987 as a principal investigator on USDA project she spent time on several universities and institutes in USA, and in 1992 within TEMPUS project in Gent University. She was an expert in arbitration among Croatia and USA regarding the sunflower oil import. Except international she was head investigator on 4 national scientific projects and several programs of collaboration with industry. She is a member of AOCS, IFT, Euro Fed Lipid etc. She was a member of Organization/Scientific Committee of many scientific and professional confrences. She participates actively in work of wide range of expert bodies at State Office for Standardization and Metrology, Croatian Chamber of Economy and Zagreb Fair.

List of relevant titles published within the last five years:

No.	Title
1.	Rade, Desanka; Mokrovčak, Željko; Štrucelj, Dubravka; Škevin, Dubravka; Neđeral, Sandra. The effect of processing conditions on the nontriacylglycerol constituents of sunflower oil. *Acta Alimentaria*. **33** (2004) , 1; 7-18
2.	Škevin, Dubravka; Rade, Desanka; Štrucelj, Dubravka; Mokrovčak, Željko; Neđeral, Sandra; Benčić, Đani. The influence of olive variety and harvest time on the bitterness and phenolic compounds of olive oil. // *European Journal of Lipid Science and Technology*. **105** (2003) , 9; 536-541
3.	Marušič,V., Štrucelj, D., Ivandić, Ž. Povećanje učinkovitosti procesa prerade sjemena suncokreta primjenom novih postupaka zaštite za smanjenje intenziteta trošenja dijelova pužnih preša. *Kem. Ind.* **53,** 393 – 400 (2004).
4.	Stanić, R., Štrucelj, D. (1995) Effect of storage conditions on the quality of unrefined sunflower oil. *Prehrambeno-tehnol. biotehnol. rev.* **33**, 37-41.
5.	Rade, D., Neđeral Nakić, S., Škevin, D., Štrucelj, D., Mokrovčak, Ž. Sterol content and composition of some non-refined and refined oils, 2nd Central European Meeting 5th Croatian Congress, 17 - 20 October 2004, Opatija, Croatia.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Raič, M., Štrucelj, D., Škevin, D.: Influence of medium chain triglycerides (MCT) on the oxidative stability of oils and fats present in pretrerm infant formulae. Proceedings of 1st Slovenian Congress on Food and Nutrition with international participation, Bled, April 1996 , vol.II, pp. 697-704.
2.	Mentorstvo: Babić, B. Ispitivanje fizikalno-kemijskih karakteristika čvrste i tekuće faze pri frakcijskoj kristalizaciji svinjske masti. Magistarski rad, Prehrambeno-biotehnološki fakultet, Zagreb (1993)
3.	Mentorstvo: Čaušević, S. Uticaj uslova skladištenja na kvalitetu margarina, Magistarski rad, Poljoprivredni fakultet, Sarajevo (1991)

Curriculum course (subject) instructor:

Associate professor	**Desanka**	**Rade**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of food engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed:	**MODIFIED FATS AND OILS**
E-mail address:	derade@pbf.hr
Address of personal web page:	-
Date of last review:	March 10th, 1998
CV (no more than 1200 characters):	Born on November 21st, 1942 in Vrebec, Gospić, Croatia. Chemical technical school finished in Zagreb. In 1963 she was employed as technical staff member in Section of Biotechnology at Technological Faculty, where she was also admitted as student in 1966. Graduated in 1976, got her masters in 1983 and doctoral degree in 1990. 1963-1977 she worked as technician in Laboratory for Oils and fats technology, 1977-1983 as B.S. assistant, 1983-1991 as assistant, 1991-1998 as assistant professor and since 1998 as associate professor on the same subject. 1992 she was in Zug, Switzerland on "Gas chromatography training course" and in 1996 spent two weeks in Palm Oil Research Institute of Malaysia. She participates in subjects Lipid chemistry and technology, Food preparation processes, and is in charge of subject Basic technologies of vegetable origin food preparation and subject in postgraduate study Food additives. Since 2002. year is principal investigator on a scientific project, She supervised about 40 diploma works, 2 master theses and one dissertation. She has published 11 papers in journals indexed in international system and 20 papers published in journals with national reviewing and proceedings of international and domestic scientific conferences.

List of relevant titles published within the last five years:

No.	Title
1.	Rade, Desanka; Mokrovčak, Željko; Štrucelj, Dubravka; Škevin, Dubravka; Neđeral, Sandra. The effect of processing conditions on the nontriacylglycerol constituents of sunflower oil. *Acta Alimentaria*. **33** (2004) , 1; 7-18
2.	Škevin, Dubravka; Rade, Desanka; Štrucelj, Dubravka; Mokrovčak, Željko; Neđeral, Sandra; Benčić, Đani. The influence of olive variety and harvest time on the bitterness and phenolic compounds of olive oil. *European Journal of Lipid Science and Technology*. **105** (2003) , 9; 536-541
3.	Rimac Brnčić, Suzana; Lelas, Vesna; Rade, Desanka; Šimundić, Borislav. Decreasing of oil absorption in potato strips during deep fat frying. *Journal of Food Engineering*. **64** (2004) ; 237-241

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Alabanda, K. Određivanje udjela čvrste faze kakao maslaca NMR metodom, Diplomski rad, Prehrambeno-biotehnološki fakultet, Zagreb (1995)
2.	Jukić, D. Određivanje udjela čvrste faze masti u desertnoj i mliječnij čokoladi primjenom NMR, Diplomski rad, Prehrambeno-biotehnološki fakultet, Zagreb (1995)

Curriculum course (subject) instructor:

Associate professor	**Željko**	**Mokrovčak**
Scientific-educational title	Name	Surname

Domicile institution – institution of higher education of course instructor: Department for food engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: **MODIFIED FATS AND OILS**

E-mail address: zmokra@pbf.hr

Address of personal web page: -

Date of last review: May 10th, 1998

CV (no more than 1200 characters):

Born on July 4th, 1942 in Zagreb, where he finished elementary school and School of chemical technology. In 1961 he entered Technical Faculty, University of Zagreb, where he was employed as technical staff member and graduated in 1976. In 1977 he entered Postgraduate study of Chemical engineering on Technology Faculty. In 1982 he got his masters degree in biotechnical sciences, area biotechnology. He made his dissertation in Laboratory for oils and fats technology and defended it in May, 1991. He worked as technical staff member in Laboratory for oils and fats technology 1977- 1982, when he acquired vocation of assistant. He was elected to assistant professor in 1992 and to associate professor in 1998. Since 1988. he was in charge of subject Technological design in Faculty of Food Technology in Osijek and 1989-1991 he participated in teaching in Faculty of Agriculture in Sarajevo. 1997-2001 he was Head of Department for food engineering. He was a member of Initiative Committee of Croatian Biotechnical Foundation and president of Initiative Committee of Club of Food Technologists, Biotechnologists and Nutritionists.

List of relevant titles published within the last five years:

No.	Title
1.	Škevin, D., Rade, D., Štrucelj, D., **Mokrovčak, Ž.**, Neđeral, S., Benčić, Đ. (2003) The influence of variety and harvest time on the bitterness and phenolic compounds of olive oil. Eur. J. Lipid Sci. Technol. **105** 546-541.
2.	Rade, D., **Mokrovčak, Ž.**, Štrucelj, D., Škevin, D., Neđeral, S. (2004) The Effect of Processing Conditions on the Nontriacylglycerol Constituents of Sunflower Oil, Acta Aliment. **33** 7-18.
3.	Rade, D., Neđeral Nakić, S., Škevin, D., Štrucelj, D., **Mokrovčak, Ž.** Sterol content and composition of some non-refined and refined oils, 2nd Central European Meeting 5th Croatian Congress, 17 - 20 October 2004, Opatija, Croatia, poster.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Rade, D., Mokrovčak, Ž., Štrucelj, D.: Neke mogućnosti dobivanja monoglicerida. Zbornik radova Savjetovanja o unapređenju uljarstva, Beograd (1985) str. 267-278.

I. BASIC DATA ON PROPOSED MODULE

Name of module: **Green Chemistry**

Core course of studies for module: **Biotechnology**

Course of studies:	Under-graduate (Bs)	or	Graduate (Ms)	x	Append X in the appropriate box

Academic year in which module appears (semester): 2/ III

Module status: Ground, ElectiveA, Elective B: Elect B

Language:

Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Doc. Review April 2005	**Marijana**	**Jukić**
Scientific-educational title	name	surname

Number of ECTS points: 3

Total number of contact hours: 35

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	20
	Auditory Practice	
	Laboratory Practice	15
	Practicum	
	Seminar	
	Field Work	

Requirements for signature to be appended

Attending lectures and efficiently completed laboratory practices

Manner in which examination is taken:	Written	X	Oral	X	Append X in the appropriate box

Description of module (in no more than 1200 characters):

Green Chemistry defines as the use of chemistry for pollution prevention, and design of more environmentally benign chemical products and processes. Green Chemistry utilizes 12 principles that reduces or eliminates the use or generation substances hazardous for human health and environment. Through the several dominant trends of the green program such as catalysis, biocatalysts and the use of alternative: renewable feedstock (biomass), reaction media (water, ionic liquids and supercritical fluids), reaction conditions (microwave irradiation) and new synthetic pathways (photo catalytic reaction) the dual goals - environmental protection and economic benefit can be achieved.

Catalysis as one of the foundational pillars of green chemistry through the new catalytic routes and new benign catalysts offers greater improvements in efficiency, selectivity and energy reduction.. Biocatalysis through the enormous potential of microorganisms and enzymes for the transformation of synthetic chemicals with high chemo-, regio- and enantioselectivity manner is another green chemistry trend which is gaining an increasing interest in laboratory research, and industry application. Photocatalytic reaction as a new method for an air and water purification is a growing field of basic and applied research being another trend of green program for achieving sustainability.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

The aim is to demonstrate and teach students methods with which Green Chemistry reduces the environmental impact of chemical processes and technologies and adoption green chemistry in the manner that enhances both, the environmental and economic performance..

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	Green Chemistry, Theory and Practice, Paul T. Anastas, John C. Warner, Oxford University Press, 1998.
2.	Green Organic Chemistry: Strategies, Tools, and Laboratory Experiments,"Kenneth M. Doxsee, James E. Hutchison, Brooks/Cole, ISBN: 0-759-31418-7 (2004).
3.	*A. Liese, K. Seelbach, C. Wandrey*, Industrial Biotransformations, Wiley-VCH, Weinheim 2000,
4.	*K. Faber,*: Biotransformations in Organic Chemistry, Springer, Berlin, 2000.
5.	*W.-H. Xie, L. Yu, D. Chen, J. Li, J. Ramirez, N. F. Miranda, P. G. Wang*, u: *P. T. Anastas, T. C. Williamson* (ur.), Green Chemistry: Frontiers in Benign Chemical Syntheses and Processes, Vol. 8, Oxford Univeristy Press, New York, 1998.

Recommended literature

No.	Title
1.	Green Chemistry at Work: Product can be made from Glucose Insted of Benzene, J. Frost , EPA Journal **20** (3) 1994, 22
2.	Environmental Education from an Industrial Perspective, J. C.- Tully, ACS Preprints, Division of Environmental Chemistry 34, 1994 No 2, 203
3.	Collection of lectures, Summer Schools on Green Chemistry, Venice 1998-2000, Green Chemistry Series No.1, P. Tundo (ur.) INCA, 2001.
4.	Pollution Prevention in the Organic And Inorganic Chemistry Laboratory: Microscale Approach, M M Singh et al, *ASC Preprints, Division of Environmental Chemistry*, 1994,
5.	Microwave and High Frequency Heating Principles and Chemical Applications, A. Breccia, A. C. Metaxas (ur.), UCISCRM, Bologna, Italy, 1997.

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Doc. Review April 2005	**Marijana**	**Jukić**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department for Chemistry and Biochemistry

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [x] instructor [ ] Append X in the appropriate box

Title of curriculum module executed: **Green Chemistry**

E-mail address: mjukic@pbf.hr

Address of personal web page:

Date of last review: Review April 2005

CV (no more than 1200 characters):

I was born in Zagreb 1951. where I finished primary and secondary school. 1978. I get a degree from Technological faculty University of Zagreb – biotechnological department with graduation thesis *Polyoxy Chemistry Contribution* (proof. dr. sc. M. Laćan).At the Chemical Technological Faculty University of Zagreb I win the master's of science-chemistry degree 1985 with thesis *The Influence of Chemical Sulphur Sensitizers on the Photographic Sensitivity of AgBr Photographic Emulsion* (academician K. Balenović*).* At the same Faculty I took doctor's of science-chemistry degree 1989 with dissertation *Synthesis of Photoactive Agents and Evaluation of Photographic Emulsions* (academician K. Balenović*).* From 1978 to 1990 I was work as a technologist-researcher in Fotokemika-(film factory) Research Department. From 1991 to 1995 I work as a headmistress of Fotokemika Research Development Centre. From 1995 till now I work as a assistant lecturer at Food Technology and Biotechnology Faculty –Department for Chemistry and Biochemistry. I proclaimed 9 scientific paper in journal CC indexed, 2 revive and 2 expert paper. I am author of 2 technological improvement and 5 product- new type of industrial X-ray film. I am quite good in English and little used German language.

List of relevant titles published within the last five years:

No.	Title
1.	M. Jukić, M. Cetina, G. Pavlović, V. Rapić, A One-Pot Synthesis and Structure Determination of 3-(1-Phenyl-5-*p*-tolylpyrazol-3-yl)-2-*p*-tolylindole Ethanol Solvate, *Struc. Chem.* **10** (l999) 85-90.
2.	Stjepan Milardović, Zorana Grabarić, Vlatko Rumenjak and Marijana Jukić, Rapid Determination of Oxalate by an Amperometric Oxalate Oxidase-Based Electrode, *Electroanalysis* **12** (13) (2000) 1-8.
3.	Ž. Filipović-Kovačević, M. Mikšaj, N. Berčuk, M. Jukić, Amperometric Biosensor for Monitoring Respiration Activity of *Saccharomyces cerevisiae* in the Presence of Cobalt and Zinc, *Food Technol. Biotechnol*. **40** (2) (2002) 111-117.
4.	M. Cetina, M. Jukić, V. Rapić, A. Golobič, Ferrocene Compounds. XXXVIII. Dimethyl ferrocene-1,1'-dicarboxylate, *Acta Crysallographica Section C-Crystal structure Communications* **59** (2003) m212-m214
5.	M. Jukić, A. Hergold-Brundić, M. Cetina, A. Nagl, J. Vorkapić-Furač, The Synthesis and Structures of the Novel Pyridoxal Oxime Derivatives, *Structural Chemistry* **14** (6) (2003) 597-604

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	M.Jukić, S. Đaković, Ž. Filipović-Kovačević, J. Vorkapić-Furač, " Green chemistry opens the way for clean ecologically acceptable chemical process, *Kemija u industrij* **53** (5) (2004) 217- 224.(review)
2.	M. Jukić, S. Đaković, Ž. Filipović-Kovačević, V. Kovač i J. Vorkapić-Furač, Dominant Trends of Green Chemistry **,** *Kemija u industrij* (2004/5) 00-00. (review acceptable for paper)
3.	D. Badrov, Ž. Filipović-Kovačević, M. Mikšaj, M. Jukić, Determination stability of Amperometric Biosensor with immobilisation yeast *Saccharomyces* cerevisiae, *PBN revija (ISSN 1334-0719)* 1 **i** 2 (2004) 05-11.
4.	Marijana Jukić, Vladimir Rapić, Dražen Vikić-Topić, Jasna Vorkapić-Furač, Classical and Microwave- Assisted Synthesis and Spectroscopic Analysis of Some Pyrazole Derivatives, 13th European Symposium on Organic Chemistry, September 10-15. 2003, Cavtat, Dubrovnik
5.	*Synthesis and characteristic of metallocenes and heterocyclic* -researcher project 058 023 MTZ (2000-) *Plant biologically active compounds glucosinolates and polyphenols* consultants project 058 024 MTZ (2000-)

Curriculum course (subject) instructor:

Full professor	**Jasna**	**Vorkapić-Furač**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of biochemical engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: **Green Chemistry** (lectures and laboratory practice)
E-mail address: jvfurac@pbf.hr
Address of personal web page:
Date of last review: 2000. g.
CV (no more than 1200 characters): Born on August 31, 1942, in Banja Luka, Bosnia-Herzegovina. Completed her elementary and secondary education in Karlovac. Graduated in 1967 from the Faculty of Technology – Department of Biotechnology, University of Zagreb. Obtained her M. Sc. at the Faculty of Science, University of Zagreb, in 1975, and her Ph. D. in 1984 at the Faculty of Technology, University of Zagreb. She spent sabbatical year 1973/74 in the USA as a Fulbright Fellow. 1967-1970 worked as Research Associate at the FTI, and 1970-1989 as Assistant at the Faculty of Food Technology and Biotechnology, University of Zagreb. In 1989 promoted to Scientific Associate, 1990 to Assistant Professor, 1996 to Associate Professor and 2000 to Full Professor at 3 undergraduate collegia at the Faculty of Food Technology and Biotechnology, University of Zagreb. She holds 2 and co-holds 1 collegia at the postgraduate study at the Faculty of Food Technology and Biotechnology, University of Zagreb. She was mentor of 11 papers awarded by the Rector's Award as well as 49 university diplomas, 2 MScs and 1 PhD. Worked on 8 scientific projects as co-investigator, principal investigator on 1 scientific and 1 expert project. Published 44 scientific and 2 expert papers and 4 chapters in books. Author of 1 and co-author of 2 intern scripts and 1 textbook. Participated at 21 international and 17 national meetings. Member of CBS, CSB, CMS and the international association EEMS.

List of relevant titles published within the last five years:

No.	Title
1.	K.Delonga, Z.Šmit, V.Dragović-Uzelac, V.Mrkić, J.Vorkapić-Furač: "Hydrolysis Products of glucosinolates from white cabbage (*Brassica oleracea* L. var. *capitata*) and cauliflower (*Brassica oleracea* L. var.*botrytis*) analyzed by HPLC and GC/MS" *Proceedings of Euro Food Chem XI Meeting*, Biologically-active phytochemicals in food (analysis, metabolism, bioavailability and function), Norwich 2001, FECS special publication No 269 (2001) 213-217.
2.	M.Jukić, S. Đaković, Ž. Filipović-Kovačević, J. Vorkapić-Furač: "Zelena" kemija otvara put čistim ekološki prihvatljivim kemijskim procesima" *Kemija u industriji* **53** (5) (2004) 217.
3.	M. Jukić, S. Đaković, Ž. Filipović-Kovačević, V. Kovač, J. Vorkapić-Furač: "Dominantni trendovi "zelene" kemije" *Kemija u industriji* (2004/5) 00-00. (review accepted for publication)
4.	K.Delonga, V.Dragović-Uzelac, V.Mrkić, S.Kovač, J.Vorkapić-Furač: "Variation in glucosinolates composition and relationship between aliphatic and indole glucosinolates in cruciferous vegetables " *Current Studies of Biotechnology, Vol. III – Food*, Zagreb, (2003) 209-219.
5.	K.Delonga, I.Radojčić, L.Duraković, V.Mrkić, J.Vorkapić-Furač, Duraković, Senadin: "Indole glucosinolates from white cabbage and cauliflower and their bioactive breakdown products" *Current Studies of Biotechnology, Vol. III – Food*, Zagreb, (2003) 219-228.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Z. Kniewald i sur., Priručnik za pripravu i izolaciju biološki djelatnih supstancija, (sveuč. priručnik), Alfej d.o.o., Zagreb, 2000.
2.	M.Jukić, S. Đaković, Ž. Filipović-Kovačević, J. Vorkapić-Furač: "Zelena" kemija otvara put čistim ekološki prihvatljivim kemijskim procesima" *Kemija u industriji* **53** (5) (2004) 217.
3.	M. Jukić, S. Đaković, Ž. Filipović-Kovačević, V. Kovač, J. Vorkapić-Furač: "Dominantni trendovi "zelene" kemije" *Kemija u industriji* (2004/5) 00-00. (review accepted for publication)
4.	Four graduation thesis
5.	Scientific project: *Plant biologically active compounds: glucosinolates and polyphenols* (MZT RH 0058024, 2002-)

I. BASIC DATA ON PROPOSED MODULE

Name of module: **THE FUNDAMENTALS OF BIOORGANOMETALLIC CHEMISTRY**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): _____

Module status: Ground, ElectiveA, Elective B **Elective B**

Language: English
Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full Professor	**Vladimir**	**Rapić**
Scientific-educational title	name	surname

Number of ECTS points 2
Total number of contact hours: 38

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	15
	Auditory Practice	
	Laboratory Practice	23
	Practicum	
	Seminar	
	Field Work	

Requirements for signature to be appended

Attending lectures and efficiently completed laboratory practices.

Manner in which examination is taken: Written [ ] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

In the introduction definition of bioorganometallic chemistry is elaborated. Thereafter overview of natural bioorganometallic compunds with emphasis on their biological activity is given. The role of bioorganometallic compunds in biomolecular labelling and recognition is explained too. The peptide nanotubes, one of the bases of nanotechnology, are elaborated. The role of metallocenes in imunoassays, as well as the role of bioconjugates in DNA-hybridization detection are explained. The applications of bioorganometallic compounds in pharmacology and biomedicine are described. Spectroscopic analysis (IR, ^{1}H-NMR) of bioorganometallic compounds prepared during the laboratory practice will be carried out at the end of the module.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

The issues which enable students to introduce new researches in the fields of biotechnology, pharmacology and biomedicine are given.

Literature (list should include details on publisher and year of publication):
Compulsory literature

No.	Title
1.	W. Beck et al.: **Bioorganometallic Chemistry-Transition Metal Complexes with α-Amino Acids and Peptides**, *Angew. Chem. Int. Ed.* **37** (1998) 1634.
2.	N. Metzler-Nolte: **Labeling of Biomolecules for Medicinal Applications-Bioorganometallic Chemistry at Its Best**; *Angew. Chem. Int. Ed.* **40** (2001) 1040.
3.	G. Jaouen et al.: **Bioorganometallic chemistry: Structural diversity of organometallic complexes with bioligands and molecular recognition studies of several supramolecular hosts with biomolecules, alkali-metal ions, and organometallic pharmaceuticals**, *Organometallics* **22** (2003) 2166.

Recommended literature

No.	Title
1.	G. Jaouen et al.: **The first organometallic selective estrogen receptor modulators (SERMs) and their relevance to breast cancer**, *Current Medicinal Chemistry* **11** (2004) 2505.
2.	D. van Staveren, N. Metzler-Nolte, *Chem. Rev*. **104** (2004) 5931-5985.

I. BASIC DATA ON PROPOSED MODULE

Name of module: **THE PEPTIDOMIMETICS AND PSEUDOPEPTIDES**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): **2./III.**

Module status: Ground, ElectiveA, Elective B **Elective B**

Language: English
Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full Professor	**Vladimir**	**Rapić**
Scientific-educational title	name	surname

Number of ECTS points 3
Total number of contact hours: 39

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	15
	Auditory Practice	
	Laboratory Practice	20
	Practicum	
	Seminar	4
	Field Work	

Requirements for signature to be appended

Attending lectures and seminars and efficiently completed laboratory practices.

Manner in which examination is taken: Written [ ] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):

In the introduction definition and role of natural protein mimetics as models for protein studies are elaborated. Thereafter overview of peptide mimetics described in literature with emphasis on their biological activity is given. In continuation pseudopeptides which can serve as appropriate molecules for therapeuthic and similar purposes (in comparation with proteins which underwant to proteolysis, hardly pass across a cell membrane and, etc.) are elaborated. Thereby overview of pseudopeptides emphasizing their biological activity is given. Spectroscopic methods (IR, ^{1}H-NMR, CD) for identification of inter- and intramolecular hydrogen bonds and chirality of peptidomimetics and pseudopeptides identification are elaborated as well.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):

The issues which enable students to recognize new methods for researche of proteins and pseudopeptides which are important for biotechnology, pharmacology and biomedicine are given.

Literature (list should include details on publisher and year of publication):

Compulsory literature

No.	Title
1.	S. Kee et al.: Design **of beta-turn based therapeutic agents**, *Current Pharmaceutical Design*. **9** (2003)1209.
2.	J. A. Patch et al.: **Mimicry of bioactive peptides via non-natural, sequence-specific peptidomimetic oligomers**, *Current Opinion in Chemical Biology* **6** (2002) 872.
3.	M. A. Johnson et al.: **Molecular mimicry of carbohydrates by peptides**, *Australian Journal of Chemistry* 55 (2002) 13.
4.	C. Adessi et al.: **Converting a peptide into a drug: Strategies to improve stability and bioavailability**, *Current Medicinal Chemistry* **9** (2002) 963.
5.	V. Apostolopoulos et al.: **Applications of peptide mimetics in cancer**, *Current Medicinal Chemistry* **9** (2002) 411.

Recommended literature

No.	Title
1.	M. North: **Incorporation of Conformationally Constrained β-Amino Acids into Peptides**, *Journal of Peptide Science* **6** (2000) 301.

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full Professor	**Vladimir**	**Rapić**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor	Faculty of Food technology and Biotechnology, Department of Chemistry and Biochemistry

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:	**The peptidomimetics and pseudopeptides**
E-mail address:	vrapic@pbf.hr
Address of personal web page:	
Date of last review:	March 3th, 1999 Full Professor
CV (no more than 1200 characters):	I was born on April 7th, 1941 in Zagreb, where I finished a high school. In 1964 I graduated on the Faculty of Technology in Zagreb. In 1967 I completed the postgraduate study, "Organic chemistry and biochemistry" course, on the Faculty of Science in Zagreb. I defended my doctoral dissertation on the Faculty of Technology in 1971. I spent the academic year 1973/74. on the post-doctoral specialization at the Organisch-chemisches Institut der Universität Wien. I became employed in 1964 as assistant at the Faculty of Technology, Laboratory of Organic chemistry. I was appointed assistant professor in 1973, I became associate professor in 1979, and was appointed full professor in 1985. I held courses on post-graduate studies at The Faculty of Food and Biotechnology and Faculty of Science. I have so far been a supervisor of a number of graduation theses, as well as a mentor of 8 dissertations and 12 post-graduate theses. I took part in the Croatian translation and was the editor-in-chief of *IUPAC Nomenclature of organic compounds* and wrote a manual V. Rapić: *Nomenclature of organic compounds,* Zagreb, ŠK, 1991 and 1995. Together with I. Bregovac I translated the book H. S. Pine *Organic chemistry*, ŠK, 1994, and wrote a handbook *Methods of preparation and isolation of organic compounds,* ŠK, 1994. I am the author of 50 *CC*-scientific papers, 5 other scientific publications and a few professional papers and studies.

List of relevant titles published within the last five years:

No.	Title
1.	L. Barišić, V. Rapić, V. Kovač, **Ferrocene Compounds. XXIX. Efficient Syntheses of 1'-Aminoferrocene-1-carboxylic Acid Derivatives,** *Croat Chem. Acta* **75** (1) (2002) 199-210.
2.	S. Đaković, J. Lapić, V. Rapić, **Ferrocene Compounds. XXXVI. Lipase-catalyzed Enantioselective Acetylation of Prochiral 2-(ω-Ferrocenylalkyl)propane-1,3-diols**, *Biocatalysis and Biotransformation*, **21** (6) (2003) 291-295.
3.	S. Đaković, J. Lapić, V. Rapić, **Ferrocene Compounds. XXXVI. Lipase-catalyzed Enantioselective Acetylation of Prochiral 2-(ω-Ferrocenylalkyl)propane-1,3-diols**, *Biocatalysis and Biotransformation*, **21** (6) (2003) 291-295.
4.	V. Kovač, A. Višnjevac, V. Rapić, B. Kojić-Prodić, **Ferrocene Compounds. XL. Synthesis and characterization of ferrocene Schiff bases**, *J. Molecular Structure* **687** (2004) 107-110.
5.	L. Barišić, M. Dropučić, V. Rapić, H. Pritzkow, S. I. Kirin, N. Metzler-Nolte, **The first oligopeptide derivative of 1'-aminoferrocene-1-carboxylic acid shows helical chirality with antiparallel strands,** *Chem. Commun*. **17** (2004) 2004-2005.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	S. H. Pine, **Organic chemistry** (Croatian translation I. Bregovec and V. Rapić) chapter **Spectroscopic methods** pp. 1062-1138, Zagreb, Školska knjiga, 1994.
2.	V. Rapić, **Methods of preparation and isolation of organic compounds** (in Croatian), Školska knjiga, Zagreb, 1994.
3.	V. Rapić, **Nomenclature of organic compunds** (in Croatian) Školska knjiga, 3th modified and supplemented edition, Zagreb, 2004.
4.	**Guide to IUPAC nomenclature of organic compounds** (in Croatian), HKD and HDKI Recommendations 2001 (editor of the Croatian translation: V. Rapić; translation: I. Bregovec, Š. Horvat, K. Majerski, V. Rapić), Školska knjiga, Zagreb, 2002.
5.	Scientific Project (Principal investigator V. Rapić): **Synthesis and Properties of Metallocenes and Heterocycles** (0058023) 2002.

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full Professor	**Vladimir**	**Rapić**
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor	Faculty of Food technology and Biotechnology, Department of Chemistry and Biochemistry

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:	**The fundamentals of bioorganometallic chemistry**
E-mail address:	vrapic@pbf.hr
Address of personal web page:	
Date of last review:	March 3th, 1999 Full Professor
CV (no more than 1200 characters):	I was born on April 7th, 1941 in Zagreb, where I finished a high school. In 1964 I graduated on the Faculty of Technology in Zagreb. In 1967 I completed the postgraduate study, "Organic chemistry and biochemistry" course, on the Faculty of Science in Zagreb. I defended my doctoral dissertation on the Faculty of Technology in 1971. I spent the academic year 1973/74. on the post-doctoral specialization at the Organisch-chemisches Institut der Universität Wien. I became employed in 1964 as assistant at the Faculty of Technology, Laboratory of Organic chemistry. I was appointed assistant professor in 1973, I became associate professor in 1979, and was appointed full professor in 1985. I held courses on post-graduate studies at The Faculty of Food and Biotechnology and Faculty of Science. I have so far been a supervisor of a number of graduation theses, as well as a mentor of 8 dissertations and 12 post-graduate theses. I took part in the Croatian translation and was the editor-in-chief of *IUPAC Nomenclature of organic compounds* and wrote a manual V. Rapić: *Nomenclature of organic compounds,* Zagreb, ŠK, 1991 and 1995. Together with I. Bregovac I translated the book H. S. Pine *Organic chemistry,* ŠK, 1994, and wrote a handbook *Methods of preparation and isolation of organic compounds,* ŠK, 1994. I am the author of 50 *CC*- scientific papers, 5 other scientific publications and a few professional papers and studies.

List of relevant titles published within the last five years:

No.	Title
1.	L. Barišić, V. Rapić, V. Kovač, **Ferrocene Compounds. XXIX. Efficient Syntheses of 1'-Aminoferrocene-1-carboxylic Acid Derivatives,** *Croat Chem. Acta* **75** (1) (2002) 199-210.
2.	S. Đaković, J. Lapić, V. Rapić, **Ferrocene Compounds. XXXVI. Lipase-catalyzed Enantioselective Acetylation of Prochiral 2-(ω-Ferrocenylalkyl)propane-1,3-diols**, *Biocatalysis and Biotransformation*, **21** (6) (2003) 291-295.
3.	S. Đaković, J. Lapić, V. Rapić, **Ferrocene Compounds. XXXVI. Lipase-catalyzed Enantioselective Acetylation of Prochiral 2-(ω-Ferrocenylalkyl)propane-1,3-diols**, *Biocatalysis and Biotransformation*, **21** (6) (2003) 291-295.
4.	V. Kovač, A. Višnjevac, V. Rapić, B. Kojić-Prodić, **Ferrocene Compounds. XL. Synthesis and characterization of ferrocene Schiff bases**, *J. Molecular Structure* **687** (2004) 107-110.
5.	L. Barišić, M. Dropučić, V. Rapić, H. Pritzkow, S. I. Kirin, N. Metzler-Nolte, **The first oligopeptide derivative of 1'-aminoferrocene-1-carboxylic acid shows helical chirality with antiparallel strands,** *Chem. Commun.* **17** (2004) 2004-2005.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	S. H. Pine, **Organic chemistry** (Croatian translation I. Bregovec and V. Rapić) chapter **Spectroscopic methods** pp. 1062-1138, Zagreb, Školska knjiga, 1994.
2.	V. Rapić, **Methods of preparation and isolation of organic compounds** (in Croatian), Školska knjiga, Zagreb, 1994.
3.	V. Rapić, **Nomenclature of organic compunds** (in Croatian) Školska knjiga, 3th modified and supplemented edition, Zagreb, 2004.
4.	**Guide to IUPAC nomenclature of organic compounds** (in Croatian), HKD and HDKI Recommendations 2001 (editor of the Croatian translation: V. Rapić; translation: I. Bregovec, Š. Horvat, K. Majerski, V. Rapić), Školska knjiga, Zagreb, 2002.
5.	Scientific Project (Principal investigator V. Rapić**): Synthesis and Properties of Metallocenes and Heterocycles** (0058023) 2002.

I. BASIC DATA ON PROPOSED MODULE

Name of module: **WHITE BIOTECHNOOGY**

Core course of studies for module: **BIOPROCESS ENGINEERING**

Course of studies: Under-graduate (Bs) [ ] or Graduate (Ms) [X] Append X in the appropriate box

Academic year in which module appears (semester): **2./III.**

Module status: Ground, ElectiveA, Elective B **ElectiveA**

Language: English
Specify foreign language if course and final exam (in its entirety) can be organised in one of the EU languages (English, German, Spanish, etc.) by coordinator.

Module coordinator:

Full Professor	**Srđan**	**Novak**
Scientific-educational title	name	surname

Number of ECTS points 4
Total number of contact hours: 48

Manner in which direct instruction is conducted:

Types of instruction		
symbol	title	hours
	Lectures	24
	Auditory Practice	
	Laboratory Practice	
	Practicum	
	Seminar	24
	Field Work	

Requirements for signature to be appended
Attending lectures and seminars.

Manner in which examination is taken: Written [ ] Oral [X] Append X in the appropriate box

Description of module (in no more than 1200 characters):
In this module students will learn about renewable and fossil row materials, the use of renewable row materials in biotechnology production, types of industrial biotech processes and processes thereof, economical and acological advantages of biotech production of biomass, biodiesel, biogas, bioethanol and biochemicals (biopesticides, organic solvents, biopolimers, fine chemicals, pharmaceutical products, food additives). During seminars students will make calculations for production facilities of biogas, bioethanol, biodiesel and biopesticides.

Aim of module – knowledge and skills to be acquired by student attending module (in no more than 200 characters):
The students will learn the potential of of biotech processes in processing of renewable resources into bioenergents and biochemicals and profound economical significance of this sector in near future.

Literature (list should include details on publisher and year of publication):
Compulsory literature

No.	Title
1.	Biotechnology, Multivolume Comprehensive Tretease, (H.J. Rehm G. Reed, A. Püchler, P.Stadler, eds.), Vol. 3, (vol.ed. G. Stephanopoulos), Weinheim, New York, Basel, Cambridge, VCH, 1993.
2.	Biotechnology, Multivolume Comprehensive Tretease, (H.J. Rehm G. Reed, A. Püchler, P.Stadler, eds.), Vol. 6, (vol.ed. M. Roehr), Weinheim, New York, Basel, Cambridge, VCH, 1993.
3.	
4.	
5.	

Recommended literature

No.	Title
1.	US Presidential executive order: 13134: "Developing and Promoting Bio based Products and Bio energy"August 1999 (http://www.bioproducts-bioenergy.gov/about/eo13134.asp)
2.	European Union: Action Plan to boost research efforts in Europe, April 2003, IP/03/584 (http://europa.eu.int/comm/research/era/3pct/pdf/press-rel-en.pdf)
3.	EuropaBio, White Biotechnology: Gateway to a More Sustainable Future, April 2003 (http://www.europabio.org/upload/documents/wb_100403/Innenseiten_final_screen.pdf)
4.	OECD, Report: "The Application of Biotechnology to Industrial Sustainability" (2001) (http://www1.oecd.org/publications/e-book/9301061e.pdf)
5.	Dutch Ministry of Economic Affairs, Life Sciences, A Pillar for the Dutch Knowledge Economy, July 2003 (http://www.minez.nl/publicaties/pdfs/03I42.pdf)
6.	Biopartner. The Netherlands life science sector report 2003. Growth against the tide (www.biopartner.nl)
7.	French Young Innovative Company initiative. www.france-biotech.org
8.	UK Small Business Innovation Company. www.sba.gov/INV/venture.html
9.	12 Royal Belgian Academy Council of Applied Science, Industrial Biotechnology and Sustainable Chemistry, January 2004 (http://www.kvab.be/downloads/cawet/wg%2043%20-%20webstek.pdf)

III. DATA ON PROFESSORS INVOLVED IN MODULE INSTRUCTION

Corresponds to data required in accordance with the Rector's Conference, 4.4.

The execution of the module is supervised by the coordinator and it consists of a number of curriculum courses (subjects) taught by several instructors who may be professors or assistant professors with a degree in science or education. According to content, curriculum courses (subjects) may take the form of lectures, practical work, seminars or fieldwork.

Curriculum course (subject) instructor:

Full Professor	Novak	Srđan
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:

E-mail address: srnovak@pbf.hr

Address of personal web page:

Date of last review:

CV (no more than 1200 characters): I was born on Janury 3rd 1952. I graduated biotechnology studies on the Faculty of Technology, University of Zagreb in 1976. I have been working on the Faculty of Food Technology and Biotechnology, University of Zagreb since 1977 where I completed Master Thesis in 1984. and Ph.D. Thesis in 1992. I spent 15 months at the California Institute of Technology, Pasadena, California, USA and 10 months at Labatt Institute, London, Ontario, Canada. The area of my scientific interests cover biochemical engineering and microbial physiology. I attanded many scientific congresses with approximately 50 communications and I have published 28 scientific publications (16 of them are indexed in SCI). Professionally I worked on different biotechnological processes and procedures (beer production, organic acids, antibiotics, food products, waste water treatment and tretment of waste management). I am member of Croatian Academy of Engineering, Croatian Society of Biotechnology (4 years as the president, 9 years as the member of Executive Board) and some other societies. I am the member of the editorial board of few scientific journals. I am full professor since 2004.

List of relevant titles published within the last five years:

No.	Title
1.	B. Šantek, P. Horvat, S. Novak, D. Sunko, A. Moser and V. Marić, Estimation of axial dispersion in horizontal rotating tubular bioreactor by means of a structured model. Bioprocess Eng. 23; 265 - 274; 2000.
2.	M. Ivančić, B. Šantek, S. Novak, and V. Marić, Fermentative bioconversion in a horizontal rotating tubular bioreactor. Proc. Biochem. 39 (8); 995 - 1000; 2004.
3.	M. Ivančić, B. Šantek, S. Novak, P. Horvat and V. Marić, Bioprocess kinetics in a horizontal rotating tubular bioreactor. Bioprocess Biosyst. Eng. 26; 169 - 175; 2004.
4.	A. Slavica, B. Šantek, S. Novak and V. Marić, Microbial acetate oxidation in horizontal rotating tubular bioreactor. J. Biosci. 29; 169 - 177; 2004
5.	B. Šantek, P. Horvat, S. Novak, V. Marić, Kriteriji povećanja obujma bioreaktora, Kem. Ind., 53 (1); 7 - 24; 2004.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Biokemijsko inženjerstvo, PBF interna skripta, Zagreb (ur. V. Marić, S. Novak i P. Horvat), 1989.
2.	B. Šantek, P. Horvat, S. Novak, D. Sunko, A. Moser and V. Marić, Estimation of axial dispersion in horizontal rotating tubular bioreactor by means of a structured model. Bioprocess Eng. 23; 265 – 274, 2000.
3.	J. Šušković, S. Novak, V. Marić and S. Matošić, Lactic acid fermentation kinetics on different carbon sources. Preh. Bioteh. Rev. 29; 155-158, 1991.
4.	S. Novak and V. Johanides, Impact of biochemical engineering on biomedicine, in Current Studies of Biotechnology 1. Biomedicine, 45 –50, 2000.
5.	B. Šantek, P. Horvat, S. Novak, A. Moser and V. Marić, Studies on mixing in horizontal rotating tubular bioreactor: II. Prediction systems for adjustable parameters of "spiral flow" model., Bioprocess Eng.; 19 ; 19 - 28; 1998.

Curriculum course (subject) instructor:

Associate Professor	Predrag	Horvat
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [X] instructor [ ] Append X in the appropriate box

Title of curriculum module executed:	Lectures (10 units), practicum and seminar
E-mail address:	phorvat@pbf.hr
Address of personal web page:	
Date of last review:	December 18th 2001.
CV (no more than 1200 characters):	He was born in 1953. in Jurčevac (District of Međimurje). He completed elementary school in 1967 and high school in 1971 in Varaždin. He graduated at Department of Biotechnology, Faculty of Technology, at University of Zagreb in 1976 acquiring the degree of the Bachelor of Science. He obtained Masters degree in 1983, and Doctoral degree in 1989 at Faculty of Food Technology and Biotechnology, University of Zagreb. He worked on constructing of the Yeast Factory and the Polyester fibbers Factory and as well during production at the Yeast Factory and the Institute of security, conflagration protection and human environment safety as Technical manager. He was advisor for projecting and supervision of bioprocess facilities at companies ASA and Tepro-BWT, Austria. Since 1986. works at Faculty of Food Technology and Biotechnology as assistant, docent and associated professor (Field of Biochemical Engineering and Industrial Microbiology). He participated in UNESCO-IBRN seminar. As postdoctoral fellow RZ Alpe-Adria he resided at TU Graz where he became scientific researcher (Austrian-French project "Mixing and Bioreactors Performance"), and researcher at "Institut fuer Biotechnologie und Bioprozesstechnik", "Institut fuer Grundlagen der Verfahrenstechnik" and "Institut fuer Ressourcenschonende und Nachhaltige Systeme". Today Prof. Predrag Horvat is lecturer of Biochemical Engineering and Kinetics of Processes in Biotechnology.

List of relevant titles published within the last five years:

No.	Title
1.	G. Braunegg, R. Bona, P. Horvat: Study On Potential Routes For Acrylamide Synthesis And/Or Synthesis Of Precursors, 1-55. (2004) (Review, 55 pages, 95 references, elaborated under the contract for CIBA Basel R&D ,available only under permission from the contractor)
2.	Koller, Martin; Bona, Rodolfo; Braunegg, Gerhart; Hermann, Carmen; Horvat, P.; Kroutil, Markus; Martinz, Julia; Neto, Jose; Pereira, Luis; Varila, Paula: Production of Polyhydroxyalkanoates from Agricultural Waste and Surplus Materials**.** Biomacromolecules (2005 in press) ISSN: 1525-7797.
3.	M. Koller*, R. Bona, C. Hermann, P. Horvat, J. Martinz, J. Neto, L. Pereira, P. Varila and G. Braunegg: Biotechnological Production of Poly(3-hydroxybutyrate) by Wautersia eutropha: Application of Green Grass Juice and Silage Juice as Novel Complex Co-Substrates , Biocatalysis and Biotransformation, (2005 in press)
4.	M. Ivančić, B. Šantek, S. Novak, P. Horvat and V. Marić: Bioprocess kinetics in a horizontal rotating tubular bioreactor. Bioprocess Biosyst. Eng. 26; 169 - 175; 2004.
5.	

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	Nenadic, I.; Mihaljevic, K.; Bosnjak, M.; Horvat, P.: Application efficiency of biomass hydrolyzate separated in oxytetracycline production, Mededelingen - Faculteit Landbouwkundige en Toegepaste Biologische Wetenschappen (Universiteit Gent) 61(4b), 2149-2152, 1996.
2.	Neubeck, Michael; Prenner, Elmar; Horvat, P.; Bona, Rudolfo; Hermetter, Albin; Moser, Anton: Membrane fluidity in glutamic acid-producing bacteria Brevibacterium sp. ATCC 13869. Archives of Microbiology , 160(2), 101-7, 1993.
3.	Malesevic, N.; Cvjeticanin, A.; Horvat, P.; Pavusek, I.; Maric, V.: Inhibition of growth by the product of Acetobacter aceti S-2 in batch fermentation, Chemical and Biochemical Engineering Quarterly 6(2), 71-4, 1992.
4.	Stefanec, Z.; Vranar, K.; Horvat, P.; Pavusek, Ivanka : Role of nitrogen sources and metal ions in urease synthesis by Micrococcus varians, World Journal of Microbiology & Biotechnology, 6(2), 195-200, 1990.
5.	P.Horvat:" Utjecaj faktora okoline na sintezu ureaze u stanicama bakterije Micrococcus varians i kinetiku razgradnje uree" disertacija (1989)

Curriculum course (subject) instructor:

Associate Professor	Božidar	Šantek
Scientific-educational title	name	surname

Domicile institution – institution of higher education of course instructor: Department of Biochemical Engineering

FAZ employees should note the DEPARTMENT at which they work;
subcontracted instructors are required to append a statement accepting terms of employment as specified in this form and written permission from the head of their domicile institution for the relevant period:

Status: coordinator [ ] instructor [X] Append X in the appropriate box

Title of curriculum module executed: Lectures (2 units), practicum
E-mail address: bsantek@pbf.hr
Address of personal web page:
Date of last review: December 1st 2003.

CV (no more than 1200 characters):

Born in Ludbreg (Croatia) on May 27th, 1966. He finished primary school in Ludbreg and secondary school for chemical technician in Varaždin (1985). After army service (1986) he started the study on the Faculty of Food Technology and Biotechnology, University of Zagreb and he graduated in 1990. In 1991 he started to work as a research assistant at the Faculty of Food Technology and Biotechnology. He defended his M. Sc. Thesis in 1994 and PhD Thesis in 1996. In 1998 he was appointed for Assistant Professor at the Faculty of Food Technology and Biotechnology, University of Zagreb. From February 1st 2001 until February 1st 2002 and June 1st 2002 until December 1st 2002 he was guest researcher at University Bielefeld (Germany). On December 1st 2003 he was appointed for Associate Professor in the Department of Biochemical Engineering of the Faculty of Food Technology and Biotechnology, University of Zagreb. Until now, results of his scientific work were presented in 14 papers and at 22 posters. He was invited speaker on three scientific conferences. He speaks English and German.

List of relevant titles published within the last five years:

No.	Title
1.	B. Šantek, P. Horvat, S. Novak, D. Sunko, A. Moser and V. Marić, Estimation of axial dispersion in horizontal rotating tubular bioreactor by means of a structured model. Bioprocess Eng. 23; 265 - 274; 2000.
2.	M. Ivančić, B. Šantek, S. Novak, and V. Marić, Fermentative bioconversion in a horizontal rotating tubular bioreactor. Proc. Biochem. 39 (8); 995 - 1000; 2004.
3.	M. Ivančić, B. Šantek, S. Novak, P. Horvat and V. Marić, Bioprocess kinetics in a horizontal rotating tubular bioreactor. Bioprocess Biosyst. Eng. 26; 169 - 175; 2004.
4.	A. Slavica, B. Šantek, S. Novak and V. Marić, Microbial acetate oxidation in horizontal rotating tubular bioreactor. J. Biosci. 29; 169 - 177; 2004
5.	B. Šantek, P. Horvat, S. Novak, V. Marić, Kriteriji povećanja obujma bioreaktora, Kem. Ind., 53 (1); 7 - 24; 2004.

Titles that qualify the instructor to execute courses (module coordinators should include titles that qualify them to act as module supervisors):

No.	Title
1.	B. Šantek, Utjecaj vode na pripremu, učinkovitost i potrošnju sredstava za čišćenje i dezinfekciju, Svijet Piva, 3; 6-12; 1998.
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3.	M. Felski, E. Flaschel, K. Friehs, B. Šantek, M. Lotz, Fermentation von *Euglena gracilis* in konditioniertem Kartoffelfruchtwasser (KFW) mit dem Ziel der Paramylon - Produktion, Chemie Ingenieur Technik, 74 (5), 2002, 600 - 601.
4.	B. Šantek, P. Horvat, S. Novak, B. Mayr, A. Moser and V. Marić, Mathematical model of mixing in a horizontal rotating tubular bioreactor : "Spiral flow" model. Bioprocess Eng. ; 14 ; 223 - 229; 1996.
5.	B. Šantek and V. Marić, Temperature and dissolved oxygen concentration as parameters of *Azotobacter chroococcum* cultivation for use in biofertilizers, Biotechnol. Letters 17 (4); 453 - 458; 1995.