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Organska hrana smanjuje izloženost djece poljoprivrednim pesticidima

U publikaciji EMORY Health Sciences News od 23. rujna 2005. autor Robert W. Woodruff iz Health Sciences Center piše o studiji posvećenoj prehrani djece organskom hranom koju su vodili istraživači s Emory University (Atlanta). U studiji je pokazano da prehrana djece organskom hranom ima vrlo izraženi utjecaj u vrlo kratkom vremenu na izloženosti pesticidima koji se uobičajeno upotrebljavaju u poljoprivrednoj proizvodnji širom SAD-a (engl. :malathion i chlorpyrifos s trgovačkim nazivom Dursban). Razultati te studije objavljeni su i dostupni u znanstvenom časopisu Environmental Health Perspectives (EHP).

Voditelj studije Chensheng Alex Lu s Emory University sa suradnicima s University of Washington i Centers for Disease Control and Prevention tijekom pet dana kada su djeca konzumirala organsku hranu, mjerio je u urinu 23 učenika osnovih škola iz Seattlea sadržaj navedenih organofosfornih pesticida (OP).

U prva tri dana studije ispitivanja djeca stara između 3 i 11 godina uzimala su uobičajenu hranu nakon čega je u sljedećih pet dana ta hrana zamijenjena organskom, zdravom hranom proizvedenom bez upotrebe pesticida. Na kraju je u zadnjih sedam dana ispitivanja u jelovnik ispitanika vraćena uobičajena hrana.

Odmah nakon uvođenja u jelovnik organske hrane koncentracije organofosfornih pesticida u tijelima ispitanika bitno su se smanjile i bile su ispod granice detekcije primijenjene metode određivanja sve dok u prehranu nije vraćena konvencionalno proizvedena hrana.

Tijekom uzimanja organske hrane u većini uzoraka urina nisu se mogli izmjeriti metaboliti malationa. Međutim, odmah nakon povratka na uobičajenu hranu srednje vrijednosti koncentracija metabolita malationa porasle su za 1,6 ppb s rasponom vrijednosti od 1 ppb do 263 ppb. Sličan trend određen je i za drugi pesticid pa je od 1 ppb tijekom uzimanja organske hrane koncentracija porasla na 6 ppb kad su ispitanici organke proizvode zamijenili konvencionalnim.

Istraživači su posebno naglasili da su zbog osigurnja mjerljive promjene izloženosti pesticidima putem hrane koja se može pripisati uzimanju organske hrane a ne samoj promjeni hrane, uzimali organske prehrambene proizvode koje djeca konzumiraju u obliku konvencionalih proizvoda. Zamijenjeni organski proizvodi uključivali su svježe voće i povrće, sokove, obrađeno voće i povrće kao što je na primjer šalša od rajčica, te proizvodi od pšenice i kukuruza kao što su tjestenina, kokice i prženi krumpiri.

Poznato je da organofosforni spojevi izazivaju neurološka oštećanja kod ljudi i životinja. Novije promjene propisa s ciljem smanjenja izloženosti pesticidima trebale su ili zabraniti ili ograničiti primjenu organofosfornih pesticida u okolišu. Međutim, u poljoprivredi su ugrađene znatno slabije mjere. Prema godišnjem izvještaju američkog Department of Agriculture Pesticide Data Program organofosforni pesticidi još uvijek se rutinski mogu izmjeriti u prehrambenim proizvodima koje uobičajeno uzimaju mala djeca.

(Izvor: National Institute for Health (NIH); internetska adresa: www.vih.gov; National Institute of Environmental Health Science)

društvene vijesti

EFCE Bologna Recommendations

European Federation of Chemical Engineering (EFCE) Recommendations for Chemical Engineering Education in a Bologna Two Cycle Degree System
(as of September 2005)

Foreword by EFCE Scientific Vice-President

In September 2003 European Federation of Chemical Engineering published a statement on the Bologna Process, in which it welcomes and supports the aims of the Bologna Declaration. Among these aims there is the adoption of an easily readable and comparable system of higher education, essentially based on two main cycles of study, as well as the development of comparable criteria and methodologies, particularly with regard to curricula development, inter-institution cooperation and mobility schemes.

In its statement EFCE announced the preparation of an update of the recommendations for the core curriculum for Chemical Engineering studies, published previously in the years 1994/2000. The update was to take into account recent developments in study organization, in curricula accreditation guidelines, and in science and engineering.

This update has now been prepared by the EFCE Working Party on Education, and approved by the EFCE Executive Board on July 14, 2005. It is being published below.

On this occasion a few words of comment seem necessary.

The Federation has no intention to enforce any ready made teaching programmes on the institutions of higher learning, or to hinder the development of new concepts of study. However, it feels necessary to point out, that degree programmes comprising hardly any mention of such fundamental for the profession subjects as, for example, thermodynamics, fluid mechanics, transport phenomena, separation techniques or reaction engineering, cannot be called chemical engineering programmes (unfortunately, such programes still do exist at some schools).

The Recommendations put the emphasis on the learning outcomes. The core curriculum covers about two thirds of the total, and leaves space for modifications and innovations.

I hope that the Recommendations will be of help in the development of Chemical Engineering curricula by individual institutions of higher learning, and express my thanks to the members of the Working Party on Education for their effort put into preparation of the Recommendations.

Ryszard Pohorecki
EFCE Scientific Vice-President

Introduction

As Europe is implementing the Bologna two cycle degree system the European Federation of Chemical Engineering (EFCE) believes it would be useful to formulate recommendations for a chemical engineering education in a Bologna type study organization. EFCE has earlier, in 2003, published a statement supporting the goals of the Bologna process[1].

According to the 2001 and 2003 communiques of the Conferences of the Ministers responsible for Higher Education, "first and second cycle degrees should have different orientations and various profiles in order to accommodate a diversity of individual, academic and labour market needs". This is a view shared by the EFCE, and has been established practice among the higher education institutions offering a chemical engineering education. Nevertheless, there are certain methods and techniques common to all chemical engineering. EFCE feels that particularly the first level study must give enough emphasis on what is the common chemical engineering core, which in brief is the technology of modifying, separating, and reacting materials and substances.

These recommendations cover

– Learning outcomes
  - general chemical engineering skills and knowledge
  - transferable skills
– Achieving the learning outcomes
  - Core curriculum
  - Teaching and learning
  - Industrial experience
  - Review of the educational process
  - Student assessment

The learning outcomes are formulated in a general way, to emphasize what should be common to chemical engineering education. The core curriculum proposed here with additional appropriate topics in science, in chemical and other engineering, and in non-technical areas will give a variety of concrete contents to the general outcomes. Thus, different chemical engineers will be able to handle the demands of different industries and tasks: e.g. oil refining, bulk and fine chemicals, paper, polymers, food, cosmetics, pharmaceuticals, environmental issues. Particularly second level graduates will be able to perform research tasks and go on to doctoral studies.

A large percentage of chemical engineers are now engaged in making various specialty products (formulated products), and relatively fewer in making traditional commodity chemicals. While all chemical engineers still need much of the traditional chemical engineering skills, the EFCE feels there is now a need to include some knowledge of "product engineering" in the common core in order to reflect the increasing importance of modern materials science.

Common general outcomes and a common core curriculum will also facilitate one of the goals of the Bologna process: More and simpler exchange in Europe both during and after the studies.

The core curriculum proposed here covers only approx. two thirds of a first and a second level degree study leaving the higher education institutions freedom for innovative concepts in developing their study programmes further.

Learning outcomes

In line with recommendations/requirements from other bodies (including accreditation bodies), EFCE has formulated its recommendations first and foremost as outcomes, i.e. what the students should know or be able to do right after graduation.

[1] Chemical Engineering Research and Design (Trans. IChemE) 81/A10, 1406, November 2003; http://www.efce.info

First cycle degree chemical engineering outcomes

After graduation, a first level degree chemical engineer should

1. have a knowledge of relevant basic sciences (mathematics, chemistry, molecular biology, physics) to help understand, describe and deal with chemical engineering phenomena
2. understand the basic principles underlying chemical engineering:
   a) material, energy, momentum balances
   b) equilibrium
   c) rate processes
   (chemical reaction, mass, heat, momentum transfer)
   and be able to use them to set up and to solve (analytically, numerically, graphically) a variety of chemical engineering problems
3. understand the main concepts of process control
4. understand the principles underlying methods of process/product measurements
5. be able to plan, perform, explain and report simple experiments
6. have a knowledge of relevant literature and data sources
7. have a basic understanding of health, safety, and environmental issues
8. understand the concept of sustainability
9. understand basic concepts of chemical product engineering
10. have knowledge of some practical applications of process and product engineering
11. have an ability to analyse complex problems in the chosen orientation
12. have some experience in using appropriate software
13. be able to perform appropriate design in the chosen orientation
14. be able to calculate process and project costs

Second cycle degree chemical engineering outcomes

A second cycle degree study will be characterized by greater differentiation both between institutions and between students. Thus, the objective is even less based upon specific common knowledge but instead on common methods to set up and to solve various problems.

After graduation a second level degree chemical engineer should

1. be more proficient in the first level competencies in the chosen orientation
2. use deeper knowledge of the underlying phenomena to build more advanced models
3. be able to use appropriate computational tools
4. be able to perform more advanced experiments and to give more advanced interpretations of the results
5. be able to analyse, evaluate and compare relevant alternatives in the chosen orientation
6. be able to synthesize and optimize novel solutions
7. be able to self study a topic in depth

EFCE expects the final outcomes of a second cycle degree programme to be (at least) equivalent to those of traditional long-cycle (4,5 – 5 years) programmes.

Transferable skills

An engineering education should give the engineer a number of transferable skills, which are more or less independent of the type of engineering. These skills are not specific to the core or to the degree level, but will be acquired to some extent in the first level study and will be deepened in the second. Such skills have been formulated in many ways; EFCE has chosen the formulation given by the US accreditation body ABET with some minor modifications:

After graduation, an engineer should

1. be able to communicate effectively, including in English, using modern presentation tools as appropriate
2. be able to work in multidisciplinary teams
3. have an understanding of the impact of engineering solutions in an environmental and societal context
4. have an understanding of professional end ethical responsibility
5. be able to learn on his/her own, and have a recognition of the need for life-long learning

Achieving the learning outcomes

Core curriculum

To ensure the proper common content and proper levels of the different first and second cycle degrees, EFCE recommends minimum amounts of subjects (e.g. mathematics) for both cycles and in addition topics (e.g. reaction engineering) for the first cycle. These minimum amounts are called the core curriculum. While the first cycle core curriculum is both specific and extensive, there is still much of the total study left to give variations in orientation. For the second cycle the recommendations are very general, making it easy to give a broad range of different orientations within and between institutions while meeting the general outcomes.

There is no exact correspondence between the learning outcomes and the core curriculum. The outcomes can only be reached through the combined effect of the core curriculum and the additional courses in each cycle.

Note that the curriculum recommendation lists topics. EFCE makes no recommendation on the number of courses that should be given, or on how topics should be grouped in courses. Furthermore, in practice many of the listed topics will be part of larger courses containing more than just the core.

As the common European credit unit is the ECTU (European Credit Transfer Unit) of which there are 60 per year, all recommendations here are given using ECTU. EFCE has chosen a 3 + 2 years two cycle scheme as an example. For other schemes the figures have to be adapted accordingly.

First cycle degree core curriculum

Science and mathematics:	min 45 ECTU
Mathematics, statistics, numerical methods, information science	min 20
Chemistry, physics and molecular biology (incl. laboratory)	min 25
Chemical engineering:	min 65 ECTU
Material and energy balance calculations	min 4
Thermodynamics / physical chemistry	min 10
Fluid dynamics	min 6
Separations (mechanical, equilibrium based, mass transfer based)	min 5
Heat transfer	min 3
Reaction engineering	min 3
Materials of construction	min 2
Basic product engineering	min 3
Process control and instrumentation	min 3
Process analytical techniques	min 3
Safety, health, environment	min 3
Chemical engineering laboratory	min 6
First cycle thesis / Chemical engineering project	min 12
Non-technical topics:	min 10 ECTU
Economics and management	min 2
Total sum	min 120 ECTU

Typically, a first cycle study will contain 20-30 % science courses, 40–50 % engineering courses, and up to 10 % non-technical topics. The core recommended here gives a science content of 25 %, an engineering content of 36 %, and a non-technical content of 6 % of the total study (180 ECTU), leaving one third to deeper coverage of some of these topics and to other topics.

Second cycle degree core curriculum

Although no topics are specified here, it is clear from the recommended learning outcomes that central chemical engineering topics such as transport phenomena, chemical reaction engineering, dynamic modelling as well as general topics such as statistics/optimization/parameter estimation must be included to the extent they have not already been covered in the first cycle study.

Science and mathematics:	min 15 ECTU
Chemical engineering topics:	min 40 ECTU
Second cycle thesis / Chemical engineering project	min 20 ECTU
Total sum	min 75 ECTU

The core curriculum makes up 63 % of the total study (120 ECTU), leaving approx. three quarters of a study year for additional specialization and broadening.

Teaching and learning

Irrespective of the degree structure, the teaching and learning methods must be appropriate for the topic in question, and be chosen so that the learning outcomes can be achieved. The teaching and learning methods should also help develop students' skill to work both independently and in teams. Thus, to learn to function in teams, group work is necessary. To be able to communicate, communication tasks must be given and solved. To learn to learn and to take responsibility for their own learning, students must be given appropriate self study and problem solving tasks during their study. To understand ethical, societal, environmental and professional issues, suitable examples for illustration or discussion must be included. The study should be organized to ensure that students work during all of the semester, and are able to make the relevant connections between the different subjects.

All courses should as far as possible give examples from several areas, to show the broad applicability of chemical engineering methods.

Industrial experience

Industry has an important role to play in the education of chemical engineers. Industrial experience serves to illustrate the applications and limitations of theory, helps to set the courses in a wider context and motivates for the remaining study. In addition, it provides social skills for later leadership roles. Industrial experience for all can only be obtained if industry accepts the responsibility of providing sufficient placements.

Review of the educational process

Each educational institution should have an ongoing review of the educational process, to ensure that the parts are up to date and properly coordinated, and that each and every part contributes towards the aims of the course, and in general to improve the educational outcomes.

Student assessment

EFCE would like to emphasize the need for appropriate feed-back to maximise the learning effect of the assessments.