

ТЕЛЕМЕДИЧНА ПЕДАГОГІКА

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Master's degree program at Biomedical informatics

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РЕЗЮМЕ, ABSTRACT

The presented here Master's degree program Biomedical informatics in *New Bulgarian University* is new modern interdisciplinary program that bears the marks of contemporary notions of Internet education in informatics, biomedical and health sciences. The training is based on information and IT-management principles and processes, where the evolution of the term is associated with ideas about starting a powerful technological informatization of medical and health practice, but today the emphasis is on interpretation techniques – in seeking integration between algorithmic and software and human / expert appearances (Ukr.z.telemed.med.telemat.-2012.-Vol.10,№1.-P.74-78).

Key words: ehealth, learning, management

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ПРОГРАМА ПІДГОТОВКИ МАГІСТРІВ З БІОМЕДИЧНОЇ ІНФОРМАТИКИ

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У статті представлена програма підготовки магістрів з біомедичної інформатики в *New Bulgarian University*, це мультидисциплінарна програма, що ґрунтується на сучасних принципах використання інтернет-освіти в інформатиці, біомедичних та інших науках про здоров'я. Навчання будується на принципах і процесах ІТ-менеджменту й інформатики, метою яких є ефективна технологічна інформатизація медичної практики, а також пошук оптимальних взаємовідносин між розроблювачами й споживачами біомедичних інформаційних технологій (Укр.ж.телемед.мед.телемат.-2012.-Т.10,№1.-С.74-78).

Ключові слова: електронна охорона здоров'я, навчання, керування

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ПРОГРАММА ПОДГОТОВКИ МАГИСТРОВ ПО БИОМЕДИЦИНСКОЙ ИНФОРМАТИКЕ

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В статье представлена программа подготовки магистров по биомедицинской информатике в *New Bulgarian University*, это мультидисциплинарная программа, построенная на современных принципах использования Интернет-образования в информатике, биомедицинских и иных науках о здоровье. Обучение строится на принципах и процессах ИТ-менеджмента и информатики, целью которых является эффективная технологическая информатизация медицинской практики, а также поиск оптимальных взаимоотношений между разработчиками и потребителями биомедицинских информационных технологий (Укр.ж.телемед.мед.телемат.-2012.-Т.10,№1.-С.74-78).

Ключевые слова: электронное здравоохранение, обучение, управление

The program is closely associated with the University's mission as a responsive and entrepreneurial institute, because in today's market environment is changing all the philosophy, organization and structure of healthcare, the need for this type of footage is undeniable.

Biomedical informatics is a discipline located at the intersection of IT, telecommunications and computer science on the one hand and health, medicine and biomedicine, on the other. It deals with the resources, devices and methods required to optimize the processes of acquisition,

storage, retrieval and use of information in health and biomedicine.

The toolkit, which handles biomedical informatics includes not only computers but also clinical and paraclinical specialties, specialized terminology system, as well as information and communication systems and technologies (ICI). The standards that cover this issue are presented by ICS 35.240.80, where ISO 27799:2008 is one of the main components.

It deals with algorithms, databases and information systems, web technology, artificial intelligence and information theory, software engineering, data mining, image processing, modeling and simulation, signal processing, discrete mathematics, control and system theory, theory chain and statistics to generate new knowledge of biology and medicine, as well as improving and finding new biomedical computer models.

According to the Computing Curricula 2005 Computer, the educational courses are generally divided into 5 categories:

- Computer Engineering
- Computer Science
- Information Systems

- Information technology
- Software Engineering

The location of the Masters degree program Biomedical Informatics is in Information Systems category, because information systems specialists focus on integrating solutions for information systems and technologies, particularly biomedical ones, allowing to achieve the objectives in the most effective and efficient manner. The perspective of this program is the use of information technology as a tool for generating, processing and dissemination of biomedical information.

Experts in biomedical information systems play a major role in determining the requirements for specialized software, whose activity is aimed at designing and implementing such systems.

The shaded part of the figure 1 presents applications courses in Information Systems. As seen from the top of the field programs primarily affect organizational issues as IS professionals dealing with the relationship between information systems and organizations that serve, in this case - biomedical and health organizations.

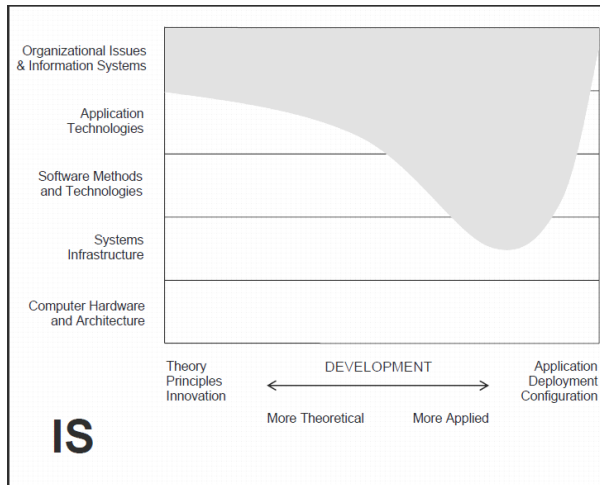


Figure 1. Learning courses in Information Systems

Many IS professionals also participate in developing systems and in training their users. Shaded area at the image shows IS professionals, who are involved in the adaptation of information technologies (especially databases) for the purpose of the assignment. They often develop systems using other software solutions, required for a specific job.

The presented demonstration table lists 60 indicators in 11 categories, summarizing

the relative abilities, which should complete these directions. Each parameter has a numerical value from 0 to 5, where 0 describes the absence of full knowledge of the indicator, and 5 is the highest relative one. In this respect, the table shows that biomedical information specialists must be able to analyze the information and processes, specifying design systems that are aligned with some organizational goals.

Table. Knowledge and skills have to be obtained during Master's program

Area	Performance Capability	CE	CS	IS	IT	SE
Algorithms	Prove theoretical results	3	5	1	0	3
	Develop solutions to programming problems	3	5	1	1	3
	Develop proof-of-concept programs	3	5	3	1	3
	Determine if faster solutions possible	3	5	1	1	3
Application programs	Design a word processor program	3	4	1	0	4
	Use word processor features well	3	3	5	5	3
	Train and support word processor users	2	2	4	5	2
	Design a spreadsheet program (eg, Excel)	3	4	1	0	4
	Use spreadsheet features well	2	2	5	5	3
	Train and support spreadsheet users	2	2	4	5	2
Computer programming	Do small-scale programming	5	5	3	3	5
	Do large-scale programming	3	4	2	2	5
	Do systems programming	4	4	1	1	4
	Develop new software systems	3	4	3	1	5
	Create safety-critical systems	4	3	0	0	5
	Manage safety-critical projects	3	2	0	0	5
Hardware and devices	Design embedded systems	5	1	0	0	1
	Implement embedded systems	5	2	1	1	3
	Design computer peripherals	5	1	0	0	1
	Design complex sensor systems	5	1	0	0	1
	Design a chip	5	1	0	0	1
	Program a chip	5	1	0	0	1
	Design a computer	5	1	0	0	1
Human-computer interface	Create a software user interface	3	4	4	5	4
	Produce graphics or game software	2	5	0	0	5
	Design a human-friendly device	4	2	0	1	3
Information systems	Define information system requirements	2	2	5	3	4
	Design information systems	2	3	5	3	3
	Implement information systems	3	3	4	3	5
	Train users to use information systems	1	1	4	5	1
	Maintain and modify information systems	3	3	5	4	3
Information management (Database)	Design a database mgt system (eg, Oracle)	2	5	1	0	4
	Model and design a database	2	2	5	5	2
	Implement information retrieval software	1	5	3	3	4
	Select database products	1	3	5	5	3
	Configure database products	1	2	5	5	2
	Manage databases	1	2	5	5	2
	Train and support database users	2	2	5	5	2
IT resource planning	Develop corporate information plan	0	0	5	3	0
	Develop computer resource plan	2	2	5	5	2
	Schedule/budget resource upgrades	2	2	5	5	2
	Install/upgrade computers	4	3	3	5	3
	Install/upgrade computer software	3	3	3	5	3
Intelligent systems	Design auto-reasoning systems	2	4	0	0	2
	Implement intelligent systems	2	4	0	0	4
Networking and communications	Design network configuration	3	3	3	4	2
	Select network components	2	2	4	5	2
	Install computer network	2	1	3	5	2
	Manage computer networks	3	3	3	5	3
	Implement communication software	5	4	1	1	4
	Manage communication resources	1	0	3	5	0
	Implement mobile computing system	5	3	0	1	3
	Manage mobile computing resources	3	2	2	4	2
Systems Development Through Integration	Manage an organization's web presence	2	2	4	5	2
	Configure & integrate e-commerce software	2	3	4	5	4
	Develop multimedia solutions	2	3	4	5	3
	Configure & integrate e-learning systems	1	2	5	5	3
	Develop business solutions	1	2	5	3	2
	Evaluate new forms of search engine	2	4	4	4	4

Scoring column in Information Systems has a maximum total score of 158 points. The presented masters degree program covers 79 points in 18 parameters, because the specificity of Biomedical Informatics does not allow coverage of certain parameters.

The covered parameters are sufficient to enable students to learn how to assess and quantify organizational information needs and to design practical schemes to meet these requirements.

In "Education and Training for Health Informatics in Europe State of the Art - Guidelines – Applications", Volume 25 Studies in Health Technology and Informatics Edited by: A. Hasman, A. Albert, P. Wainwright, R. Klar and M. Sosa, 1995, 286 pp., Hardcover, ISBN: 978-90-5199-234-2 are presented recommendations on strategies for teaching biomedical and health informatics to the member states of the European Union:

- Ensuring, as soon as possible, training for staff in medical and health facilities with appropriate multidisciplinary training, theoretical and practical guidance with health information systems in the context of public health

- Developing strategies for training biomedical and health strategies,

- Establishing international cooperation through networking centers and units in specialized biomedical and health informatics education.

For the preparation of the proposed program we have explored training programs in 10 member states:

1. Belgium - Training in clinical research, health economics and quality of care through analysis of patient records

2. Denmark - Health Informatics at Aalborg University

3. Finland - Training in nursing and health administration

4. France - Training of Medical Informatics

5. Germany - Training of Medical Informatics at University of Heidelberg

6. Portugal - Nursing informatics

7. Netherlands - Training for Health Informatics

8. UK - Medical Informatics in Manchester

9. Czech Republic - training in Medical Informatics at Charles University

The program is supervised and coordinated by the Bulgarian Academy of Medicine and the Union of Scientists in Bulgaria and Society of Social Medicine We have cooperation agreements with the Medical Faculty, Health Faculty, Military Medical Academy, Academy of Sciences - Institute of Biomechanics - contract for gratuitous use of laboratory space with access to educational materials, library and expert assistance; Laboratory of Solar-Terrestrial Research - for activities related to telemedicine research and standards (fig.2). There are agreements on cooperation and assistance with computer companies, developers of medical software and telecommunication links in Technical University, Sofia.

The activities of such individuals will include working closely with bioinformaticians with a background in the biological and biophysical/biochemical science to:

- elucidate requirements

- develop new algorithms

- implement computer programs and tools for bio data analysis and display of results

- design databases for bio data

- participate in data analysis

Furthermore, there is a growing demand for graduates with software engineering and distributed systems skills to develop and maintain the powerful and sophisticated computer systems that support research, development and production activities in bioinformatics. There is a heavy use of internet and intranet technology within the sector in order to manage the storage, analysis and retrieval of biodata whose attributes are

- large volume

- rapidly increase in volume

- high complexity



Figure 2. Methodology issues and handbooks of the Master's program

Biomedical sciences department has CDs and DVDs, 5 textbooks and multitude digital educational library with more than 40 number of specialized glossaries and guides.

Conclusion

The need for bioinformatician is well known among the industrialists and academicians in the area. Demand of these trained and skilled personnel, which has opened up a new carrier option as bioinformaticians, is high in academic institution and in the bioindustries. This demand will clearly become exacerbated with advances in genomics and post genomic research. This skill gap is highly visible around the world.

The carrier in bioinformatics is divided into two parts-developing software and using it. Most of the bioinformatics companies mostly prefer persons from physics, maths or computer science background rather than biologists-turned programmers.

There is a growing need nationally and internationally for bioinformaticians, especially graduates with a good grounding in computer science and software engineering, and an appreciation of the bio and medical aspects of the problems to be solved.

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