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Management in Biophotonics and Biotechnologies

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Abstract

Biophotonics, one of the most exciting and rapidly growing areas, offers vast potential for changing traditional approaches to meeting many critical needs in medicine, biology, pharmacy, food, health care and cosmetic industries. Follow the market trends we developed new MSc course Management in Biophotonics and Biotechnologies (MBB) that provide students of technical disciplines with the necessary training, education and problem-solving skills to produce professionals and managers who are better equipped to handle the challenges of modern science and business in biophotonics and biotechnology. A major advantage of the course is that it provides skills not currently available to graduates in other Master programs.

Summary

Biophotonics, one of the most exciting and rapidly growing areas, offers vast potential for changing traditional approaches to meeting many critical needs in medicine, biology, pharmacy, food, health care and cosmetic industries. The total market in the field can be estimated as \$25 billion per year worldwide [1]. Remarkable growth in medical instrumentation, biophotonics and biotechnologies are expected to drive the market after 2005 [2]. Follow the market trends we developed new MSc course Management in Biophotonics and Biotechnologies (MBB) that provide students of technical disciplines with the necessary training, education and problem-solving skills to produce professionals and managers who are better equipped to handle the challenges of modern science and business in biophotonics and biotechnology. A major advantage of the course is that it provides skills not currently available to graduates in other Master programs.

Nowadays, the existing Master programs in Life Science, Bioengineering, Biotechnologies, Health Care, etc. are essentially taught from a general management perspective by faculty based within the business school, and not able to offer courses taught by experts in technology. Various existing MSc programs within the physics & engineering schools offer depth in a particular science or technology, but without the management perspective. Medical schools spend a significant time for clinical staff training in practical application of specific technologies (e.g. optical biopsy, endoscopy and/or related optical diagnostic procedures), and no training is currently available to provide clinicians with the knowledge and understanding of core discipline underlying the technologies employed. The proposed MSc MBB course will provide



physics/engineering students with the necessary training, education and problem-solving skills to produce specialists and managers, who are better equipped to handle the challenges of modern business in modern medical physics, biotechnology and bioengineering industries.

The MBB program is designed specifically to prepare graduates both for an applied research career in the fields of biomedicine, bio-photonic materials and in the bio-tech, health-care and cosmetics industries. MSc MBB course introduce students to the multi-disciplinary nature of BioPhotonics and Biotechnologies areas and foster critical thinking, one of cornerstone of MBB author's teaching philosophy. MBB research projects provide graduates with advanced training in research methods, personal skills, industrial R&D management, advanced research and special areas of study. The programme place significant emphasis on teamwork and multidisciplinary international collaboration, and aim to achieve students be competitive with those of the best research universities in the world.

The MBB program is oriented at the variety of graduates including:

- Researchers, young professionals involved in Bio-Imaging, Bio-sensing, Biomedical Engineering, Bio-analytics, and many other related areas.
- Researchers associated with the development of new medical/biomedical diagnostic equipment.
- Clinical/research staff specialised in biomedical diagnostics and therapy.
- The healthcare professionals, both from industry and medicine.
- Sales staff and young managers associated with the companies selling diagnostic equipment and components;
- Managers who are responsible for running/developing new business projects in innovative bio-technologies, and who need to develop wider specific perspectives outside their own area or responsibility and expertise.

More than that, this program is of high interest for governmental employees, experienced businessmen and leading specialists in companies working in the biotechnologies sector including vendors and designers of special laboratory and clinical biomedical equipment.

The taught part of MBB programme cover all main topics and comprises of a series of compulsory modules, including: Principles of Biophotonics & Biotechnology, Introduction to Physiology and Anatomy for Bioengineers, Biomedical Optics, Bio-Imaging and Microspectroscopy, Light Activated Therapy and Diagnostics, Biosensors, Healthcare Technology Assessment, and External Seminar Programmes in Biotechnologies. Plus, four to five relevant electives selected by the student and approved by the course Steering Coordination Committee, including: accounting, finance, human resources management, labour relations, marketing, managerial decision theory, economics, interpersonal skills, engineering writing, presentation skills, report writing, project management and team building.

Elective modules can be selected from a pharmaceutical focus; health care and cosmetic products; engineering for a medical devices and some others. These options are readily available however other directions will be designed with the MBB's course



leaders shortly. This is based on the particular interests of students and/or market trends. The MBB course includes lectures, seminars, time for demonstrations of practical research. Even introductory part includes a scaled-down research component, as a critical literature review. At the first instance MBB course combine a regular two year program engineering/physics disciplines currently available in the Saratov State University (SSU) with the core requirements of a Master degree. The working languages are both English and Russian. However, as Cranfield - SSU International Steering Coordination Committee will review the programme yearly, developing one year MSc course in English is likely possible (based on the results of launching MBB course).

An entry qualification to the programme is a technical Bachelor or similar degree with the high marks in English (the results of TOEFL, IELTS, etc. considered as advantage). All students enrolling on the course are required to undertake 200 hours per year of structured preparative learning involving assimilating appropriate basic information. Whilst the written works is submitted during this phase no marks towards the final award will be accrued. Personal and academic tutors are assigned to each student prior to receiving the assimilation material. These personnel, in addition to the SSU course director will be contactable with easier.

The norm of Credit Tariffs for the MSc MBB course is 200 credits (100 credits per year), which equivalent to a total of 2000 notional learning hours (i.e. 1 credit = 10 notional learning hours). The minimum shall be 180 credits (i.e. 1800 notional learning hours). The amount of lectures, seminars, and lab work hours within the MSc MBB course is based on the MSc's courses developed early at Cranfield University (UK).

Graduates of the program will be awarded by MSc degree in Management in Biophotonics and Biotechnologies. A major advantage of the program is that it will provide skills not currently available to graduates in any other Master program, and it will give the graduates an extra competitive edge for getting a job then.

The MSc-MBB features a highly interdisciplinary format that leverages the research and teaching expertise and academic leaderships of two international competitive centres of excellence in biophotonics & biotechnologies - Cranfield University and SSU.

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References

1. see for example Trends in Tissue Engineering, 2002.
2. see for example Electronic Manufacturing Trends in the North American Medical Industry, 2004.