Program Introduction

Established in 2008, the Biomedical Informatics Program is managed by the Department of Computer Science for its development and sharing of resources (faculties, curriculums and laboratories). To train interdisciplinary experts knowledgeable in Biology, Medicine, and Informatics, the program has appointed faculties from different fields of expertise, including researchers from the Department of Information Management and the Department of Mechanical Engineering, as well as physicians at Far Eastern Memorial Hospital and DOH Taoyuan General Hospital.

The Biomedical Informatics Program is dedicated to developing a strong interdisciplinary team to carry out forward-looking research. The scope of collaboration stretches beyond the campus to physicians at Far Eastern Memorial Hospital and DOH Taoyuan General Hospital, as well as researchers in biomedical industries. Through this dynamic research network, the program aims to promote its level of research potential and skills.

Program Characteristics

Biomedical informatics is an emerging science and, currently, one of the key areas under development by the Taiwanese government. Biomedical informatics focuses on using information technology to organize, store, analyze, manage and apply biological and medical information to improve health care and the quality of life for the general public.

This program mainly covers the following four areas:

Bioinformatics

This field is committed to combining expertise from the areas of information technology and biomedical sciences to conduct cutting-edge research on biomedical data mining and analysis, as well as computational systems biology. In the area of biomedical data mining and analysis, research interests lie in the analyses of microarray data, DNA and protein sequences, gene/protein structures and functions. Research in systems biology primarily focuses on building systematic models for mathematical analysis and simulation in order to answer biomedical and life science questions.

Biomedicine

Biomedicine is a field engaged in basic and translational research. The main objective for researchers in this field is to explore the mechanisms underlying human diseases. Biomedicine has become an interdisciplinary science in recent years. To accelerate the development of the biomedical field, experts in various areas, including public health, clinical science, biochemistry, microbiology, molecular biology, chemistry and informatics, have begun to work together as a team. As such, this program is actively working with established research institutions such as the DOH Taoyuan Hospital, Academia Sinica, Far Eastern Memorial Hospital to cultivate students with multidisciplinary skills. Students will be able to apply information technology in biomedical research, establishing a bridge of communication between information and biomedical sciences.

Medical Signal Analysis

The purpose of medical signal studies is to combine medicine and information sciences, using signals to develop image processing techniques and mathematical models. The ultimate goal is to assist clinical staff in resolving medical signals and images, thereby enhancing the accuracy of diagnoses. Traditional medical signal applications include noise removal, extraction of physiological signals, image processing and machine learning classification.

Medical Imaging

The current scope of medical imaging research in this program covers various topics, including image processing, pattern recognition, computer vision, computer graphics, computer projections, data compilation, and other related technologies used in medical and biological sciences. Researchers in this field not only hope to help medical doctors in effectively identifying pathological symptoms to make accurate diagnoses, but also to assist medical technicians in conducting comprehensive analyses of complex biological mechanisms.

This program emphasizes on enhancing students' foreign language skills and global perspectives. In addition to actively promoting professional courses taught in English and encouraging to be written in English, the program also makes grants and scholarships widely available to students who intend to study abroad, participate in

international exchanges or academic conferences.

Teaching Resources

Courses offered in this program integrate theory and practice, and are taught by faculties from the Department of Information Engineering, the Department of Information Management, the Department of Mechanical Engineering and physicians from major medical institutions.

This program shares seven teaching laboratories with the Department of Information Engineering: IC School of Design, Networking and Wireless Communications Laboratory, Human-Computer Interaction and Multimedia Laboratory, 3C digital system integration laboratory, Software Systems Laboratory, open source software, PCLAB.

Promoting dynamic teacher-student interactions, developing efficient teamwork and enhancing interpersonal skills are the top priorities in this program. In addition to the implementation of the mentoring system, the program has also established graduate assistant support for undergraduate students after school to ensure the quality of education.

This Program offers a number of scholarships to reward students for academic achievements or aid students with financial disadvantages. The various scholarships include Yo-Shiang Hsu scholarships, the Five scholarships, Overseas Scholarship, award for publication in a Computer Science journal, the Far Eastern Group, and so on.

Broad Future

- Biotechnology-related industries: research and development, planning, marketing and management
- Research assistantship in life sciences or bioinformatics research institutes
- Technicians engaged in information analysis and management at teaching hospitals and medical centers
- Biochip research and development
- Postgraduate education in bioinformatics, information engineering,

information management, biotechnology, and biomedicine-related fields.

Missions

- Information technology professionals with theories and practical knowledge in informatics, statistics, and artificial intelligence, planning and implementation skills for biomedical research projects, and independent innovation abilities
- Ability to lead, manage, coordinate, and integrate interdisciplinary teams
- Global and international perspective with a lifelong self-learning attitude for continuous improvement

Core Competence

- Fundamental knowledge in information technology, artificial intelligence, and biomedicine and professional expertise in specific fields
- Ability to plan and implement research projects of biomedical informatics
- Ability to write professional articles on biomedical informatics
- Ability of innovative thinking and independent problem solving for research projects of biomedical informatics
- Ability to lead, manage, and organize teams and collaborate with people from various fields for accomplishing research projects
- Excellent international perspective
- Ability to engage in lifelong self-learning for adaptation to rapid changes in biomedicine and information technology