PURDUE UNIVERSITY | College of Engineering

Engineering Faculty Document
No.: 3 9 - 2 5
April 7, 2025

TO: The Engineering Faculty

FROM: The Faculty of the Weldon School of Biomedical Engineering

RE: New Engineering Concentration

The Faculty of the Weldon School of Biomedical Engineering has approved the following new Concentration from the College of Engineering. This action is now submitted to the Engineering Faculty with a recommendation for approval.

TITLE:

Concentration in Artificial Intelligence and Digital Health with Industry Immersion

DESCRIPTION:

This concentration applies to these programs/major:

Programs:

- BME-MSBME

To earn this concentration, students will complete the following coursework:

- 9 credit hours in Artificial Intelligence and Digital Health, consisting of 3 of the following 3-credit courses as described below (additional courses may be developed or identified in the future in the area of artificial intelligence and digital health to fulfill this requirement).

  This concentration provides core training in AI and Digital Health while maintaining flexibility to align with individual student interests and needs. If taught alone, AI provides a limited overview of classical approaches of biomedical signal processing context, therefore creating a blind spot towards the practical health application of AI. When combined with classical signal processing techniques, students will develop a thorough understanding of both classic and AI approaches and are thus better prepared to augment AI in high impact applications that provide a unique advantage for AI. Additional course options focus on the link between digital health tools and health applications. The flexibility of choosing between a selection of courses allows students to tailor their learning experience based on their own expertise, but all together provide a holistic package in understanding and applying the unique AI capacity in the emerging field of digital health.

- Students in the **industry immersion** program will complete 1 to 3 semesters of BME 69699 Biomedical Engineering Professional Practice Graduate Internship (0 credits)

Required: Two (minimum) or Three of the Following Courses:

- BME 51100 – Biomedical Signal Processing
- BME 53800 – Wearable Sensors in Healthcare
    - NOTE: BME 53800 was previously listed as BME 59500 and the request for a permanent number has been approved by the BME GCC and is under parallel ECC review with the concentration proposal
- BME 64600 (ECE 60146) – Deep Learning – Theory and Practice of Deep Neural Networks
- IE 52500 – Healthcare Delivery Systems

If only two courses from Required list have been selected then one elective can be taken from the following:

- ECE 50024 – Machine Learning
- ECE 50836 – Introduction To Data Mining
- ECE 57000 – Artificial Intelligence
- ECE 69500 – Optimization for Deep Learning
- CS 55600 – Data Security And Privacy
- CS 57100 – Artificial Intelligence
- CS 57300 – Data Mining
- CS 57800 – Statistical Machine Learning
- CS 58000 – Algorithm Design, Analysis and Implementation
- CS 59300 – Machine Learning Theory

Note, the following additional courses will be added in the future when/if approved as permanent courses:

- BME 59500 – Healthcare Data Science
- BME 69500 – Seminars in Digital Health Transformation
- ECE 69500 – Machine Learning for Bioinformatics and Healthcare

RATIONALE:

The development of new medical technologies and devices has expanded from traditional hardware devices to an increasing reliance on software devices and supporting technologies including AI. Additionally, the delivery of healthcare and collection and use of health-related data to support treatment and new product development rely on digital technologies. This new concentration provides a focus on artificial intelligence and digital health within the medical technology ecosystem. BME students have a high level of interest in AI and digital technologies in healthcare. A concentration in this space provides an opportunity for these students to focus on this area of high demand by the healthcare industry, including manufacturers of medical devices and pharmaceuticals, and healthcare organizations.

Signed by:
Kevin John Otto
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Head/Director of the Weldon School of Biomedical Engineering

Link to Curriculog entry: https://purdue.curriculog.com/proposal:29164/form