

Clinical Immersion in Medical Device Design, Certificate

Associate Dean for Academic Affairs: Mark Federle, Ph.D.

Master's Across Boundaries Certificates Programs webpage (<https://www.marquette.edu/engineering/graduate-degrees.php#Certificate>)

DEGREE OFFERED

Certificate

PROGRAM DESCRIPTION

Identify new design opportunities, improve medical devices, or create new approaches to solve problems often encountered by clinicians and medical professionals in medical device product development with the clinical immersion in medical device design graduate certificate offered by Marquette University and the Medical College of Wisconsin. Students master the etiquette and skills of successful clinical immersion and develop observational research techniques that will uncover new medical device design opportunities.

Students complete courses online and have hands-on practical experiences in clinical simulation centers and in-person immersive clinical environments. These experiences provide engineers a unique opportunity to observe clinical procedures, facilitate clinician-designer interactions, and gain a first-hand account of how the medical devices are meeting the needs of current users. Students identify future unmet needs and opportunities for improved design practices, leading to safer and more successful medical devices.

The certificate utilizes the unique aspects of the Marquette University and Medical College of Wisconsin Joint Department of Biomedical Engineering, blending faculty expertise and the clinical setting.

Faculty Sponsor: Said Audi, Ph.D.

The joint MU-MCW Biomedical Engineering Department and the OPUS College of Engineering (Master's Across Boundaries program) offers the graduate certificate in clinical immersion in medical device design (CIMD) with a focus on the immersive experience. This 12-credit certificate is intended to provide engineers a unique opportunity to observe clinical procedures to gain a first-hand account of how medical devices are meeting the needs of current users and identify future unmet needs or opportunities for improved design practices. Designed to expand an engineer's expertise to address a wider range of skills to solve engineering problems associated with medical device product development and project completion, the certificate focuses upon the relationship of the engineer (main certificate principles) with (1) intended users, (2) intended applications, and (3) use environment.

Students must take 6 credit hours of required courses and 6 credit hours of electives. The first required course is designed to establish the foundational knowledge that will enhance the immersive experience. The other required course is the actual clinical immersion experience and reflection. The remaining credits come from a wide range of elective courses.

Code	Title	Hours
REQUIRED COURSES:		
BIEN 6301	Clinical Need Finding	3
BIEN 6302	Clinical Observation	3
ELECTIVE COURSES - choose 6 credits from the following: ¹		6
Biomedical Device and Instrumentation Theme		
BIEN 5220	Embedded Biomedical Instrumentation	
BIEN 5320	Biomedical Instrumentation Design	
BIEN 5420	Biomaterials Science and Engineering	
Physiology and Human Factors Theme		
BIEN 5700	Systems Physiology	
BIEN 5720	Cardiopulmonary Mechanics	
BIEN 6440	Biomedical Engineering Analysis of Trauma	
PSYC 5330	Human Factors Engineering	
Identifying Unmet Needs Theme		
GEEN 5820	Systems Engineering Principles and Practice	
GEEN 5830	Engineering Risk Analysis	
HCTM 6200	Health Care Technology Assessment	
HCTM 6400	Ethics of Technology Utilization	
HEAL 6840	The Environment of Health Care Delivery	

Other courses as approved by the certificate faculty sponsor, the BIEN/BME director of graduate studies (DGS) and the chair of the Joint BME Department.

Total Credit Hours:

12

- ¹ Students enrolled in the certificate do not have to follow a specific theme; however, elective courses are grouped by theme to make it easier for students to identify courses based on topics of interest. In addition, some themes total fewer than 6 credits, so it may be necessary to choose courses from more than one theme.

University Policies

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- Machine Learning for Engineering Applications, Certificate (<https://bulletin.marquette.edu/graduate/machine-learning-engineering-applications-certificate/>)
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