title	Evaluation of Degradation Processes in Orthopaedic Medical Implants
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additional	
department	Materials Engineering
proj_desc	Orthopaedic medical implants (those dealing with bone) are some of the most successful devices used in the medical industry to date. However, the metals used in medical implants still suffer from some limitations, including wear and corrosion. Both processes result in the release of small amounts of metallic ions into the patients body which may lead to future physiological problems. A variety of projects are currently in progress, and it is expected that the specific project of the student would be identified through conversations between the honor's student, MATE students, and the faculty advisor. Possible projects include the following: - Corrosion of orthopaedic implant materials. This would include corrosion of bulk samples as well as nano-scale debris generated during testing of actual implants. Samples would be corroded under different conditions to simulate a variety of physiological conditions. - Characterization of diamond coatings for orthopaedic implants. The student would assist with the chemical and microscopic characterization of diamond-like-carbon coatings placed onto a metallic substrate using a pulsed laser technology. They might also assist with mechanical and possibly corrosion testing of the coatings. - Failure analysis of retrieved implant samples and tissues. The student would assist several students working to understand the failure modes of medical implants removed from patients. This might include microscopic characterization of failed implants as well as chemical analysis of debris found in tissues proximal to the implant. - Characterization of new spinal implant technology. The student would assist in testing a new implant technology designed to enhance the performance of spinal implants. The project would entail developing specialized fixtures and specimen geometries, working with surgeons to install the medical implants correctly, and collecting mechanical test performance data.
inter_desc	All of the students working on these projects are MATE students. However, the nature of the projects is such that they include topics ranging from human physiology, chemistry, mechanics, and statistics. This would be an excellent project for students interested in engineering or the sciencese.
links	
students	3
majors	ENGR, SCM
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