BMED/BIOL/MSE/ME/PTFE 4740 Bio-inspired Design (Elective)

Catalog Description:	BMED 4740 Bio-inspired Design (3-0-3) Prerequisite(s): BIOL 1520 or BIOL 3600 or BMED 3100 or BMED 4751 or PHYS 2211 We examine evolutionary adaptation as a source for engineering design inspiration, utilizing principles of scaling, adaptability, and robust multi-functionality that characterize biological systems.
Textbook:	Effective use of search engines [e.g. Web of Science] for primary literature relevant to problem statement
Prepared by:	Jeannette Yen

Topics Covered:

1. Introduction to bio-inspired design, course content, and expectations
2. Evolution and functional "design" of organisms
3. Natural systems analyses; form and function
    a. Biomechanics and biomaterials
    b. Sensory systems and collective behavior
    c. Systems biology and homeostasis
4. Design and the creative process
5. Feasibility analyses of design concepts

Course outcomes:

Students who complete this course will be able to:
Outcome 1: Understand the biological principles that are relevant to engineering and design (Student Outcome a)
Outcome 2: Place the bio-inspired design process into a larger biological and societal context (Student Outcome h)
Outcome 3: Employ a systematic approach to biologically inspired design using a variety of methods that consider and incorporate different design options (Student Outcome c)
Outcome 4: Communicate in writing and orally about the design process at personal and technical levels (Student Outcome g)
Outcome 5: Work in self-managed teams (Student Outcome d)

Correlation between course outcomes and student outcomes:

BMED 4740											
	Biomedical Engineering Student Outcomes										
Course outcomes	a	b	c	d	e	f	g	h	i	j	k
1	X										
2								X			
3			X								
4							X				
5				X							

The Wallace H. Coulter Department of Biomedical Engineering Student Outcomes:

1. an ability to identify, formulate, and solve authentic biomedical engineering problems by integrating and applying basic principles of mathematics, life sciences, and engineering
2. an ability to use modern science and engineering techniques, skills, and computational tools to support biomedical engineering analysis and design
3. an ability to meet the desired needs of a client by designing a biomedical engineering system, component, or process
4. an ability to design and conduct experiments as well as to measure, analyze, and interpret experimental data from living systems
5. an ability to communicate effectively in both written reports and oral presentations;
6. an ability to function effectively within multidisciplinary teams
7. a broad education that enables an understanding of how ethical, social, and professional responsibilities impact the practice of biomedical engineering
8. an ability to recognize the limits of their knowledge and engage in self-directed learning
9. a knowledge of contemporary issues and challenges facing biomedical engineers