

UGC 302 D - Microworld: Medical Implant Controversies

Spring 2007

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110 Parker Hall (South Campus)

Industry/Univ. Center for Biosurfaces

Day/Time: Tuesdays & Thursdays - 9:30am - 10:50am

Location: 104 Parker Hall (South Campus)

Class Schedule/Plan for Topics and Assignments - see attached

Purpose: This course is designed for undergraduate students who are interested in learning about medical implants (e.g. breast and buttock implants, eye lens implants, artificial hips). Our purpose is to present key scientific and engineering concepts about life-saving and life-enhancing devices used in and on humans. The impacts of federal regulations and medical ethics on implant use are two main themes. The course (a) provides information to help you with ethical concerns about implant development and use and (b) provides opportunities for you to develop critical thinking skills for evaluation of your own and your family's options for implants and testing devices that may be recommended to you.

Goals and Outcomes:

1. Identify the types of materials used in major surgical repairs and "make-overs" to the human body, and explain how they were selected.
2. Learn the range of manufactured devices used in different medical and dental operations.
3. Discover the interplay of biological science, engineering, legal, manufacturing, management, financial, marketing, and regulatory skills, and serendipity, leading to new implant concepts.
4. Appreciate the roles and positions of many "stakeholders" in the inspiration, research, production, benefits, and failures and successes of prosthetic implants and implant-based operations.
5. Survey basic science and engineering concepts that are key to the development and use of safe and effective medical and dental devices, allowing understanding of "side effects" issues.
6. Acquire new knowledge about inflammation, immune reactions, infections, cloning, cancer, and the body's normal responses to implanted materials.
7. Become "educated consumers" when considering medical and dental devices and implants.

Text: "Web" assignments will serve in lieu of a formal text. You are expected to attend and participate in each class session. Reading assignments will be provided as photocopies, or as material accessible via the "web". For many class sessions, a glossary of key terms to be used that day will be provided on the UB Learns website for this course. Video footage of relevant implant situations will dramatize many of the issues, and class-wide discussion will be encouraged.

Evaluation: You will be responsible for learning the information and concepts presented in class, in addition to what is provided on the UB Learns website for the course. Your grade will be based on the following four main items, including attendance/participation:

1. Exams - **35% of course grade**
 - Take-home Exam [15%]
 - Final Exam [20%]
2. Anatomy & Physiology Information Search - **30% of course grade**
 - Drawing/schematic of assigned part or system [5%]
 - 3- to 5-minute Oral Presentation on how the part or system works [10%]
 - Annotated resources on implant assistance/replacement of the part or system [15%]
3. Quizzes - **25% of course grade**
 - Five pre-announced, in-class, 15-minute quizzes [5% each]
4. Attendance/participation - **10% of course grade**

Grading: Each assignment (e.g. a quiz, the annotated resources, an exam) will be graded as a flat A, B, C, D, or F if completed on time. Spelling, punctuation, and grammar "count" on the written summary, written paper in your own words, and take-home exam. Late assignments will be handled as described below.

Academic Integrity: You are expected to do your own work and show your own skills in this course. Information obtained from internet sources or sections of assignments copied from other sources without proper reference will be graded "F". By registering for this course, you also have agreed to adhere to the requirements of UB's academic integrity policy.

Policies and Procedures:

1. There will be no makeups of the quizzes or exams unless absence is due to a documented illness or major family problem.
2. Other completed assignments turned in late will be penalized by one grade level for each class that the assignment is late. *Example: The take-home exam was due Thursday, March 01, but was not turned in until Tuesday, March 06. If handed in on time, a "B" grade would have been given. Because it was one class overdue, the assigned grade will be "B-"; if two classes late, a B becomes a C+.*
3. All oral presentations are to be ready on Tuesday, March 20. The order of presentations will be based on a "lottery" drawing at the beginning of each class that presentations are scheduled. *If your name is drawn, and you are not present or prepared to give your presentation, the "late clock" will start [see #2, above].*
4. Disabled students will inform Dr. Baier, in writing, of their situation by Tuesday, January 30, so that appropriate adjustments can be implemented per University policies. *This is your responsibility.*
5. Student athletes will provide Dr. Baier with written documentation from the team coach, with their travel schedule, by Tuesday, January 30, so that appropriate adjustments can be implemented per University policies. *This is your responsibility.*
6. To make an appointment with Dr. Baier or Dr. Meyer, contact them directly. You also are welcome to "drop in" to see if they are available for a meeting. It is best to call first and see whether they are in the office (110 Parker Hall; Winspear Ave. side of campus), the lab (308 Squire Hall; Dental School building with red window frames, near Metro subway station), or available at a later time.

Thank you for registering for this course. We look forward to working with you!

Example of how the final course grade will be determined

Assignment	Assignment Letter Grade	Assignment Quality Points	Contribution of Assignment to Course Grade	Quality Points Toward Course Grade
Drawing/Diagram	B	3.00	5%	0.15
Oral Presentation	A	4.00	10%	0.40
Annotated Resources	B	3.00	15%	0.45
Take-Home Exam	A- [1 class late]	3.67	15%	0.55
Quiz 1	C	2.00	5%	0.10
Quiz 2	B	3.00	5%	0.15
Quiz 3	F [absent]	-0-	5%	0.00
Quiz 4	A	4.00	5%	0.20
Quiz 5	B	3.00	5%	0.15
Final Exam	B	3.00	20%	0.60
Attend/Participate	B	3.00	10%	0.30
Total Quality Points Earned in This Example				3.05
Final Course Grade*				B+
Final Quality Points Awarded for This Grade				3.33

* Total Quality Pts Earned	Final Course Grade	Total Quality Pts Earned	Final Course Grade
3.68 - 4.00	A	2.01 - 2.33	C+
3.34 - 3.67	A-	1.68 - 2.00	C
3.01 - 3.33	B+	1.34 - 1.67	C-
2.68 - 3.00	B	1.01 - 1.33	D+
2.34 - 2.67	B-	0.50 - 1.00	D
		less than 0.50	F

UGC 302 D - Microworld: Medical Implant Controversies**Spring 2007**Schedule/Plan for Topics to be covered (9:30am - 10:50am, tues/thur, 104 Parker Hall, South Campus)

TUESDAY		THURSDAY	
16jan2007 – Introductions and overview		18jan2007 – Silicones 1: breast implants, brain shunts	
23jan2007 – Self v. nonself: immune system; cancer; implants		25jan2007 - Types of materials implanted into people	
LAST DAY OF DROP/ADD PERIOD IS FRIDAY, JANUARY 26			
30jan2007 – Assignment of topics in anatomy and physiology - Silicones 2: jaw joint discs, heart valve balls		01feb2007 – Quiz #1 [5%] – Receive take-home exam - Jaw joint implants; Teflon	
06feb2007 – Heart valves: successes and failures		08feb2007 – Blood vessels: human umbilical cords, Dacron, Teflon/GoreTex	
13feb2007 – Testing in animals		15feb2007 – Quiz #2 [5%] – Artificial internal organs	
20feb2007 – Diagram of assigned system due [5%] – Artificial hips and knees - How "strong" or "durable" is a material?		22feb2007 – Medical devices: who "owns" implants?	
27feb2007 – Ethics of implantation - What is the role of the media?		01mar2007 – Take-home exam due [15%] – Clinical studies & regulation of medical devices	
06mar2007 – Quiz #3 [5%] - Infection control: history & current approaches - Mad Cow Disease		08mar2007 – Catheters - Device-centered infection	
MARCH 12 – 17, 2007 – NO CLASSES (UB'S SPRING BREAK)			
20mar2007 – Presentations [10%]		22mar2007 – Presentations, continued	
27mar2007 – Presentations, continued		29mar2007 - Presentations, continued	
03apr2007 – Quiz #4 [5%] – Cloning, genetic engineering		05apr2007 – Birth control implants and skin patches - Intrauterine devices	
10apr2007 – Biomimetics and nanotechnology		12apr2007 – Implantable ceramics - Contact lenses & implanted lenses for better vision	
17apr2007 – Quiz #5 [5%] – Artificial blood		19apr2007 - no class today; <i>Drs. Baier and Meyer at conference</i>	
24apr2007 – – Annotated resources due [15%] - Course review – full class participation		26apr2007 – preparation for final exam – full class participation	
<i>Attendance/participation [10%]</i>			
Final exam[20%] will be given during scheduled final exam week (May 3-10, 2007).			