MSE404
Biomaterials Applications
Spring 2025

Instructor:
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Teaching Assistants:
TBA
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Course Text:
Required: Xian, Wujing (2009) *A Laboratory Course in Biomaterials*. Boca Raton: CRC Press.

Available as an online resource at:
https://www.taylorfrancis.com/books/9781420075823

Supplemental: Ratner, Buddy D., ed (2013) *Biomaterials Science: An Introduction to Materials in Medicine*. 3rd Edition. San Diego: Elsevier Academic Press.

Available as an online resource at:
http://www.sciencedirect.com/science/book/9780123746269

Website: http://canvas.illinois.edu

Class Meetings:

Activity	Section	Time	Location
Laboratory	BA1	2:00 – 4:50 PM, Mon/Wed	218/220 Kiln House*
	BA2	2:00 – 4:50 PM, Tues/Thurs	218/220 Kiln House*
	BA3	8:00 – 10:50 AM, Tues/Thurs	218/220 Kiln House*
Office Hours	11:00-11:50 AM, Mon/Tues or by appointment		

*A brief lecture will be given in 122 Kiln House prior to lab as needed

Course Objectives:
1. To learn laboratory science, methods and skills that are necessary for biomedical science and engineering.
2. To develop the written and oral communication skills essential for a clear, concise and persuasive presentation of research findings and results.
3. To facilitate critical thinking about research design, experimental observations and data analysis.
4. To gain experience working as part of a team.

Grading:

Lab reports, executive reports:	65%
Pre-lab quizzes:	25%
Lab participation/attendance:	10%

Grading Scale:

98-100 = A+	92-97 = A	90-91 = A-
88-89 = B+	82-87 = B	80-81 = B-
78-79 = C+	72-77 = C	70-71 = C-
68-69 = D+	62-67 = D	60-61 = D-
≤59 = F		

*the lower number of the grading ranges may be lowered but not raised

Grading Notes:

1. This course consists of two modules. An individually written lab report will be required for each module. Lab reports will be submitted online. Late submission will receive an automatic point deduction of 5 points per day.
2. You are required to read the lab procedures before attending the lab session. A brief quiz will be given at the beginning of each lab session. The quiz will focus on the fundamental concepts of each lab, not on minute experimental details.
3. Everyone is required to keep a lab notebook which will be subjected to daily inspection.

Laboratory Policies:

1. No food or beverages are allowed in the lab. Chewing gum is discouraged.
2. Long pants (covers the legs to the ankle) and closed-toed shoes are required for entry into the lab.
3. Avoid wearing your “best” clothes and consider wearing a lab coat.
4. Confine long hair, loose clothing and dangling jewelry.
5. Cover any cuts or scrapes with a bandage before attending lab.
6. Goggles/safety glasses are available and must be worn at all times in lab.
7. Wear disposable gloves at all times.
8. Never pipet by mouth.
9. Do not pick up broken glass with your hands, use a dust pan and broom.
10. Clean your lab space and equipment before departing.
11. Please exit the lab when making personal calls or sending texts or email messages. Abuse of this rule will result in cell phones being banned from the lab. Smartphones may be used during the lab exercises as references, calculators and other similar tools.
12. Thoroughly wash hands with soap prior to leaving the laboratory.

Description of Course Modules:

Module IV: Skin tissue engineering

Two cell types, fibroblasts and keratinocytes, are used to grow skin-like tissues. Histological studies are conducted to compare natural human skin and tissue engineered skin equivalents.

Module III. Biocompatibility testing

Assorted materials are tested for their cytotoxicity using in vitro cell culture methods. These methods include direct contact, extraction and cell adhesion/proliferation assays.

Illness/Absences:

If you are sick or otherwise cannot attend class, please let the instructor know. Missed quizzes will need to be repeated, and missed labs may need to be repeated at a time suitable for both the student and instructor.

Academic Integrity:

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy found at https://studentcode.illinois.edu/article1/part4/1-401/. Ignorance is not an excuse for any academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask if you are in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

Students with Disabilities:

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor as soon as possible and provide the instructor with a Letter of Academic Accommodations from Disability Resources and Educational Services (DRES). To ensure that disability-related concerns are properly addressed from the beginning, students with disabilities who require assistance to participate in this class should apply for services with DRES and see the instructor as soon as possible. If you need accommodation for any sort of disability, please speak to me after class. DRES provides students with academic accommodations, access, and support services. To contact DRES, visit 1207 S. Oak St., Champaign, call 217-333-1970, e-mail mdisability@illinois.edu or visit the DRES website at http://www.disability.illinois.edu/.

Mental Health:
Significant stress, mood changes, excessive worry, substance/alcohol misuse or interferences in eating or sleep can have an impact on academic performance, social development, and emotional wellbeing. The University of Illinois offers a variety of confidential services including individual and group counseling, crisis intervention, psychiatric services, and specialized screenings which are covered through the Student Health Fee. If you or someone you know experiences any of the above mental health concerns, it is strongly encouraged to contact or visit any of the University's resources provided below. Getting help is a smart and courageous thing to do for yourself and for those who care about you.

Counseling Center (217) 333-3704
McKinley Health Center (217) 333-2700
National Suicide Prevention Lifeline (800) 273-8255
Rosecrance Crisis Line (217) 359-4141 (available 24/7, 365 days a year)

If you are in immediate danger, call 911.

Disruptive Behavior:
Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. Such behavior inhibits other students' ability to learn and an instructor's ability to teach. A student responsible for disruptive behavior may be required to leave class pending discussion and resolution of the problem and may be reported to the Office for Student Conflict Resolution (https://conflictresolution.illinois.edu; mconflictresolution@illinois.edu; 333-3680) for disciplinary action.

Emergency Response Recommendations:
Emergency response recommendations and campus building floor plans can be found at the following website: https://police.illinois.edu/em/run-hide-fight/.

Religious Observances:
Illinois law requires the University to reasonably accommodate its students' religious beliefs, observances, and practices in regard to admissions, class attendance, and the scheduling of examinations and work requirements. Students should complete the Request for Accommodation for Religious Observances form should any instructors require an absence letter in order to manage the absence. In order to best facilitate planning and communication between students and faculty, students should make requests for absence letters as early as possible in the semester in which the request applies.

Sexual Misconduct Reporting Obligation:
The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX and Disability Office. In turn, an individual with the Title IX and Disability Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options.

A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found at http://wecare.illinois.edu/resources/students/#confidential.

Other information about resources and reporting is available at http://wecare.illinois.edu.

Diversity, Equity, and Inclusion (DEI) Statement:
The University of Illinois, the Grainger College of Engineering, the Materials Science and Engineering department, and MSE404-BA operate under the guiding principle that "Our entire community benefits when individuals from different personal, cultural, and disciplinary perspectives are working together." MSE404-BA will be a safe and inclusive place for active learning with no tolerance for discrimination of any kind. To learn more about DEI activities in MatSE and MatSE's DEI committee here: https://matse.illinois.edu/dei. Aspects of DEI in the UIUC community are covered by the IDEA institute: https://idea.illinois.edu.

March 2025

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24 **L1** – Intro	25 **L1** – Intro	26 **L2** – **M4-S1-P1** (Fibroblast Encapsulation, p135) // **Basic Lab Skills II.5-II.8**, p83	27 **L2** – **M4-S1-P1** (Fibroblast Encapsulation, p135) // **Basic Lab Skills II.5-II.8**, p83	28	29
30	31 **L3** – **M4-S2-P1** (Seed HaCaT Cells, p140) // **Basic Lab Skills II.9-II.10**, p90					

MSE404-BS (Biomaterials Synthesis & Properties Lab) // MSE404-BA (Biomaterials Applications Lab)

April 2025

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 **L3** – **M4-S2-P1** (Seed HaCaT Cells, p140) // **Basic Lab Skills II.9-II.10**, p90	2 **L4** – **M4-S2-P2** (Culture Maintenance, add TGF-a, p142)	3 **L4** – **M4-S2-P2** (Culture Maintenance, add TGF-a, p142)	4	5
6	7 **L5** – **M4-S2-P3** (Air Exposure, p142)	8 **L5** – **M4-S2-P3** (Air Exposure, p142)	9 **L6** – **M4-S2-P2** (Culture Maintenace, p142) // **M3-S1-P1** (Seed Cells, p104) // **M3-S1-P2** (Prep Materials, p106)	10 **L6** – **M4-S2-P2** (Culture Maintenace, p142) // **M3-S1-P1** (Seed Cells, p104) // **M3-S1-P2** (Prep Materials, p106)	11	12
13	14 **L7** – **M4-S2-P4** (Fix Skin Samples, p144) // **M3-S1-P3** (Place Materials, p107) // M3-S2-P2 (Extraction Prep, p112)	15 **L7** – **M4-S2-P4** (Fix Skin Samples, p144) // **M3-S1-P3** (Place Materials, p107) // M3-S2-P2 (Extraction Prep, p112)	16 **L8** – **M3-S2-P3** (Extracting Materials, p113) // **M3-S2-P1** (Seeding Cells, p112) // **M3-S1-P3** (Evaluate Direct Contact, p108)	17 **L8** – **M3-S2-P3** (Extracting Materials, p113) // **M3-S2-P1** (Seeding Cells, p112) // **M3-S1-P3** (Evaluate Direct Contact, p108)	18	19
20	21 **L9** – **M3-S3-P1** (Sample Prep, p117) // **M3-S2-P4** (Incubating Cells, p113)	22 **L9** – **M3-S3-P1** (Sample Prep, p117) // **M3-S2-P4** (Incubating Cells, p113)	23 **L10** – **M3-S2-P5** (Extraction Evaluation, p114) // **M3-S3-P2** (Seeding Cells, p118)	24 **L10** – **M3-S2-P5** (Extraction Evaluation, p114) // **M3-S3-P2** (Seeding Cells, p118)	25	26
27	28 **L11** – **M3-S3-P4** (MTT Assay, p122)	29 **L11** – **M3-S3-P4** (MTT Assay, p122)	30 No Class			

May 2025

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1 No Class	2	3
4 **Module IV (Synthetic Skin) Report Due @ 11:59PM**	5 No Class	6 No Class	7 Last Day of MSE404-BS (No Class)	8	9	10
11 **Module III (Biocompatibility) Report Due @ 11:59PM**	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31