

**BMEN 345**  
**Biomaterials Lab**  
(1 credit)

**Spring 2015**

**Instructor:** Prof. Melissa A. Grunlan, Ph.D.  
Office: Emerging Technologies Building (ETB) 5030  
Phone: (979) 845-2406  
[mgrunlan@tamu.edu](mailto:mgrunlan@tamu.edu)  
Office Hours: Tuesdays 9:30 am – 11:30 am or by appointment.

**Teaching Assistance and Office Hours\*:**

Jake Carrow	<a href="mailto:carrowjk@neo.tamu.edu">carrowjk@neo.tamu.edu</a>	W: 12 pm – 2 pm (ETB 2034)
Taylor Hinsdale	<a href="mailto:thinsdale@tamu.edu">thinsdale@tamu.edu</a>	T: 1 pm – 3 pm (ETB 2034)
CW Peak	<a href="mailto:cpeak@tamu.edu">cpeak@tamu.edu</a>	M: 10 am – 11 am; T: 3 – 4 pm (ETB 2034)
Matthew Jones	<a href="mailto:mejvd3@gmail.com">mejvd3@gmail.com</a>	M: 11 am – 1 pm (ETB 5019)

*\*TA's are available to BMEN 345 students in any section.*

**Location:**

Emerging Technologies Building (ETB) 2034 (and other ETB labs as needed).

**Time (by Section):**

Mondays: 10:10 am – 1:10 pm (*Jake Carrow & Taylor Hinsdale*)  
Mondays: 3:00 – 6:00 pm (*Taylor Hinsdale & CW Peak*)  
Tuesdays: 3:55 – 6:55 pm (*CW Peak and Matthew Jones*)  
Wednesdays: 3:00 – 6:00 pm (*Jake Carrow and Matthew Jones*)

**Required Text:**

In addition to material presented in the lab manual, selected “Pre-lab reading” will be posted on eCampus. (Other items will also be posted on eCampus.)

**Prerequisites:** BMEN 343.

**Course Description:**

Introduction to the experimental methods used to prepare and characterize polymeric biomaterials used in biomedical engineering; related fundamental aspects of forming a hypothesis, experimental design, empirical observation, data collection, interpretation and analysis of data.

**Course Objectives:**

1. Develop an understanding of and familiarity with fabrication and characterization tools used for polymeric biomaterials in biomedical engineering.
2. Develop an understanding of structure-property relationships as it applies to thermal, mechanical, surface and morphological properties of polymeric biomaterials.
3. Gain hands-on-experience and familiarity with experimental methodologies.
4. Learn to effectively collect, analyze, interpret and communicate experimental results.
5. Learn the importance of lab safety.

## Course Outcome:

### Accreditation Board for Engineering and Technology (ABET) Outcomes:

“A”: An ability to apply knowledge of mathematics, science, and engineering: Outcome will be met via experiments which utilize various fabrication methodologies and characterization techniques.

“B”: An ability to design and conduct experiments, as well as to analyze and interpret data: Outcome will be met via experiments which require critical analysis of data collected.

“G”: An ability to communicate effectively: Outcome will be met with final poster presentation assignment.

“K”: An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice: Outcome will be met via experiments which utilize various fabrication methodologies and characterization techniques.

## eCampus:

Using eCampus, I will post the following categories of items:

- **Syllabus** – Also in lab manual.
- **SCHEDULE** – Contains: **(1)** part(s) of module(s) to be completed during a given week, **(2)** due dates for “Pre-Labs” and **(3)** due dates for “Post-Labs”.
  - WILL BE CONTINUALLY UPDATED. *Check eCampus each week!*
- **Pre-lab reading** (in addition to lab manual)
- **Pre-lab questions**
- **Post-lab questions**
- **Other updates as needed.**

## Pre-lab Lecture:

A ~10 minute lecture will precede each lab period to go over basic concepts and safety issues related to that day’s experiments. Your complete & undivided attention during this time is part of your “in-lab safety and productivity” grade.

## Grading and Point Distribution\*\*:

A = 100-90%    B = 89-80%    C = 79-70%    D = 69-60%    F = 59-0%

<b>Pre-lab questions</b> (variable points):	20%	200 points (scaled)
<b>In-lab safety and productivity</b> (25 points per lab period):	25%	250 points (scaled)
<b>Post-labs</b> (variable points):	30%	300 points (scaled)
<b>Exam:</b>	25%	250 points (scaled)

## Course Requirements:

Each lab module is divided into different “parts”. For a given class period, you will complete 1 or more “parts” from 1 or more modules.

Each week, an updated “**SCHEDULE**” will be posted on eCampus, denoting **(1)** part(s) of module(s) to be completed, **(2)** due dates for “Pre-Labs” and **(3)** due dates for “Post-Labs” for the next week. Check for updates!

Modules are conducted in teams [“A-J”] of 2 students.

“Pre-labs”, execution protocols and recording of measurements/observations during the labs, and “post-labs” are completed and handed in individually by each student (i.e. NOT 1 per team).

## **Pre-lab Questions**

- Each module has a “Pre-Lab”.
- “**Pre-lab questions**” are posted on eCampus under “Pre-lab Questions”.
- The “**Pre-Lab**” for 1 or more modules will be assigned the week before the module is started.
- *Follow the instructions* listed at the beginning of the “**Pre-Lab Questions**”:
- **Read the “sources”** listed at the beginning of the “**Pre-Lab Questions**”:
  1. Lab Manual (for the designated module)
  2. Associated “Pre-Lab Reading” materials [journal article(s) &/or book section(s)] posted on eCampus under “Pre-lab Reading”.
- “**Pre-Lab Questions**” of a given module is due at the beginning of class on the day the lab module is started (unless otherwise stated).

## **During the Lab (i.e. In-lab safety & productivity)**

- Just prior to coming to lab, each student should **re-review the experimental protocols** listed in the lab manual. This will make you safer and more efficient in the lab, improving your “in-lab” grade.
- Any actions or inactions that reduce your safety and productivity are grounds for a reduction in your “in-lab” grade. Some specifics are noted here as well as in the lab manual.
- Next to each module “part”, an expected but APPROXIMATED time listed. This is for general planning purposes. It may take less or more time depending on your preparedness and other factors.
- Certain “steps” will be **executed by a TA** and are marked as such in the lab manual. However, read these items so that you are aware of all steps of the protocol.
- Students must be **READY** to go at the **START** of their lab period.
  - Thus, you should arrive at ~5 min prior to the start of the lab period: Have everything put away, your lab coat and safety glass on, etc. at the start of the lab period.
  - Arrival after the start of the class period OR not being fully ready at the start of the class period (even if just a few minutes) is grounds for a reduction in your “in-lab” grade.
- Safety must be observed at all times, including wearing the required personal protective equipment (PPE). Safety protocols and procedures are outlined in the lab manual and noted by the TA.
  - Notably, absolutely no use of cell phones unless during specific periods of the lab period when you are prompted to take a photo of a specimen.
- Each student MUST bring their own **lab manual** to each class period.
- You **MUST** bring a **flash drive** to each class period.
- **During the experiment**, the EACH student (not just 1 per TEAM) **must complete entries** (e.g. measurements AND observations) into their lab manual with a pen.
- **Before you leave the lab:**
  - ✓ Be sure that all samples are properly labeled (per page 12) and stored in designated areas:
    - “**TEAM LETTER**”, **date**, **brief description**, “**BMEN 345**” (**Date is important as there are 4 lab periods. For Monday, list “date-AM” or “date-PM”.**
  - ✓ **Clean-up** your working area and any common area (e.g. scales, UV-plates, fume hoods, etc) that you also used regardless of your contribution to any sort of “mess.”
  - ✓ **Clean glassware.**
  - ✓ **Properly dispose of any waste.**
  - ✓ **Properly dispose of consumables** (e.g. pipettes, needles, Kim Wipes, gloves, etc)
  - ✓ Return you “**TEAM tray**” back to the shelf near the sink.
- **When the above items are completed:**
  - ✓ The TA must sign designated pages upon completion. [5 pts will be deducted per “no signature”.]
  - ✓ He/she will verify that you have recorded measurements where indicated and that you have properly cleaned & stored lab items.

## Post-Labs

- Each module has a “Post-Lab”.
- “**Post-lab questions**” are posted on eCampus under “Post-lab Questions”.
- A “**Post-Lab Questions**” for 1 or more modules will be due one week after completion of the lab module(s) at the beginning of class.
- *Follow the instructions* listed at the beginning of the “**Post-Lab Questions**”.
  - **Neatly write** (in pen) answers in the space below the questions.
  - **Staple** any graphs, photo images, etc. onto the “Post-Lab” pages or electronically cut & paste as directed.

## Exam:

- The exam will be comprehensive.

## **Additional Resources:**

Billmeyer, F.W. Textbook of Polymer Science; 3<sup>rd</sup> Edition (John Wiley & Sons, 1984; ISBN 0-471-03196-8)  
Carragher, C.E., Jr. Seymour/Carragher's Polymer Chemistry; 6<sup>th</sup> Ed.; (Marcel Dekker, Inc., 2003; ISBN: 0-8247-0806-7).  
Odian, G. Principles of Polymerization; 3<sup>rd</sup> Ed.; John Wiley & Sons, 1991; ISBN: ISBN: 0-471-61020-8.  
Sperling, L.H., Ed. Introduction to Physical Polymer Science, 4<sup>th</sup> Ed.; Wiley, 2006; ISBN: 0-471-70606-X.  
Arshady, R., Ed. Introduction to Polymeric Biomaterials; Citus Books, 2003; ISSN: 1479-1285.  
Wnek, G.E.; Bowlin, G.L.; Eds. Encyclopedia of Biomaterials and Biomedical Engineering, Vol. 1 & 2; Marcel Dekker, 2004; ISBN: 0824755626.

*\*These books are not required; however, they may be useful in presenting the course information in a different and potentially useful way.*

## **Re-grading Policy:**

\* Requests for re-grading must be submitted within one week after the work is returned (by 4 pm of that day) to one of your TA's. In a *different color ink on the front page of your work*, please note which problem you wish to have re-evaluated. Material returned for re-grading is subject to re-grading of entire assignment.

## **Late Assignments:**

Assignments may be turned in up to 24 hours late for up to 50% credit, after which no credit will be given. These should be turned one of three ways: (1) directly to Prof. Grunlan (ETB 5030) ONLY if she is in her office, (2) to her by e-mail ([mgrunlan@tamu.edu](mailto:mgrunlan@tamu.edu)) OR (3) Barbara Slusher in the front office. Assignments not handed by one of these methods will be not graded and counted as a zero.

## **Excused Absences:**

Refer to <http://student-rules.tamu.edu/rule07> for **ALL** policies regarding excused absences. Please note important details and specific requirements for BMEN 345:

Please note: “*The student is responsible for providing satisfactory evidence to the instructor to substantiate the reason for absence.*”

- In the case of injury or illness of 3 or more days, “The medical confirmation note must contain the **date** and **time** of the illness and medical professional’s **confirmation of needed absence.**”
- Also, in the case of injury or illness of less than 3 days, it is the policy of this course that the student likewise provides a medical confirmation note containing the **date** and **time** of the illness and **medial professional's confirmation of needed absence.**
- The Texas A&M University Explanatory Statement for Absence form **WILL NOT** be accepted as evidence of an excused absence for this course.

For a valid excused absence, you must PROMPTLY notify Prof. Grunlan ([mgrunlan@tamu.edu](mailto:mgrunlan@tamu.edu)).

For a valid excused absence, you must PROMPTLY make-up the missed work at a re-scheduled time:

- Make-up: In-class lab work is to be made-up on one of the other lab sections THAT week. It is expected that your lab partner will do this make-up with you (rather than in his/her regular section). (The Tuesday section is the preferred as this has the lowest enrollment.)

- In the case of an “unplanned” excused absence (only) from a Wednesday section, in-class lab work is to be made-up the following week. (Again, it is expected that your lab partner will do this make-up with you rather than in his/her regular section. The Tuesday section is the preferred as this has the lowest enrollment.)

Unexcused absences will receive a “zero” for that lab’s “in-lab safety and productivity” component AND zero points on portion(s) of a post-lab(s) for which they were absent in collecting data that was to be reported. (The other team member’s grade will not be affected.)

### Dates:

#	Date	Topic*
	<b>Week of 1/18</b>	<b>BMEN 345 sections do not meet</b>
1	Week of 1/25	Course overview, Lab safety, “TEAM assignments” etc. (see “SCHEDULE”)
2	Week of 2/1	Labs (see “SCHEDULE”)
3	Week of 2/8	Labs (See “SCHEDULE”)
4	Week of 2/15	Labs (See “SCHEDULE”)
5	Week of 2/22	Labs (See “SCHEDULE”)
6	Week of 3/1	Labs (See “SCHEDULE”)
7	Week of 3/8	Labs (See “SCHEDULE”)
	<b>Week of 3/15</b>	<b>Spring Break</b>
8	Week of 3/22	Labs (See “SCHEDULE”)
9	Week of 3/29	Labs (See “SCHEDULE”)
10	Week of 4/5	Labs (See “SCHEDULE”)
11	Week of 4/12	Labs (See “SCHEDULE”)
12	Week of 4/19	Labs (See “SCHEDULE”)
13	Week of 4/26	Exam – Exam will be given during each lab section. ( <i>You must attend your exam according to your lab section date.</i> )

### SCHEDULE:

Posted on eCampus.

List of parts of modules to be completed during a given period.

Due dates for “Pre-Labs” and “Post-Labs”.

WILL BE CONTINUALLY UPDATED.

Check each week!

**Americans with Disabilities Act (ADA) Policy Statement:**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services ([disability.tamu.edu](http://disability.tamu.edu)) in Room B118 of Cain Hall or call 845-1637.

**Academic Integrity Statement:**

Aggie Honor Code: ***"An Aggie does not lie, cheat, or steal, or tolerate those who do."***

It is the responsibility of students and instructors to help maintain scholastic integrity at the university by refusing to participate in or tolerate scholastic dishonesty (*Student Rule 20. Scholastic Dishonesty, <http://student-rules.tamu.edu>*). New procedures and policies have been adopted effective September 1, 2004. Details are available through the Office of the Aggie Honor System (<http://www.tamu.edu/aggiehonor/>). An excerpt from the Philosophy & Rationale section states: *"Apathy or acquiescence in the presence of academic dishonesty is not a neutral act -- failure to confront and deter it will reinforce, perpetuate, and enlarge the scope of such misconduct. Academic dishonesty is the most corrosive force in the academic life of a university."*

On all course work, assignments, and examinations at Texas A&M University, the following Honor Pledge shall be preprinted and signed by the student: *"On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."*