

COURSE SYLLABUS
UMBC ENCH 485L: Biochemical Engineering Laboratory (Writing Intensive)
Spring 2012
Discussion: Friday 1:00-2:15pm, Academic IV 108
Labs in Eng 334B: Tuesdays and Thursdays 9:00am-1:00pm

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Prerequisites: ENCH 482

Textbooks:

Required:

- K. Barker. *At the Bench: A Laboratory Navigator*. (any edition) New York, NY: Cold Spring Harbor Press.
- W. Xian. *A Laboratory Course in Biomaterials*. (any edition) Boca Raton, FL: CRC Press.

Highly recommended but not required and on reserve in the UMBC library:

- R.H. Perry and D.W. Green. *Chemical Engineers' Handbook*. (any edition) New York, NY: McGraw Hill.
- Chemical engineering transport texts such as
J.R. Welty, C.E. Wicks, R.E. Wilson. *Fundamentals of Momentum, Heat, and Mass Transfer*. (any edition) New York, NY: John Wiley & Sons.
R.W. Fox, A.T. McDonald. *Introduction to Fluid Mechanics*. (any edition) New York, NY: John Wiley & Sons.
F.P. Incropera, D.P. DeWitt. *Introduction to Heat Transfer*. (any edition) New York, NY: John Wiley & Sons.
- A chemical engineering kinetics text such as
H.S. Fogler. *Elements of Chemical Reaction Engineering*. (any edition) Upper Saddle River, NJ: Prentice Hall.
- Chemical engineering unit operations text such as
W.L. McCabe, J.C. Smith, P. Harriott. *Unit Operations of Chemical Engineering*. (any edition) New York, NY: McGraw-Hill.
C.J. Geankoplis. *Transport Processes and Unit Operations*. (any edition) Englewood Cliffs, NJ: Prentice Hall.

Goals:

Based on your work in this course, you should be able to:

- Use the knowledge acquired in previous mathematics, science and chemical engineering courses to analyze and interpret information acquired by operating process equipment or carrying out biochemical engineering experiments.
- Communicate technical information to others through written reports.

In addition, you should:

- Enhance your ability to conduct and design experiments, including consideration of safety concerns.
- Gain experience with working as part of a team.
- Increase your ability to use the techniques, skills and tools necessary for engineering practice.

Writing in the Discipline:

ENCH 485L is designated as writing intensive (WI). Formal laboratory reports constitute the writing component of this course. Laboratory reports will require you to critically present appropriate technical background material, present your data in a clear and logical way, concisely interpret results and discuss the implications of your data. The format, guidelines and criteria for evaluation of the written assignments will be discussed at the beginning of the semester. Principles for effective communication of laboratory results will be discussed throughout the semester within the context of a specific writing sample. Academic integrity with respect to writing will also be discussed at the beginning of the semester. Topics include plagiarism, how to appropriately cite references, falsification of data and misrepresentation of results.

You will write 5 individual laboratory reports (each ~5-7 pages in length) and 1 technical memo (1-2 pages in length). Each will be used to focus on your writing skills and will therefore be submitted, evaluated by the instructor, and returned to you for possible revision based on this feedback. All laboratory reports will be graded for both writing and technical content.

Grading:

Written reports: Reports on experiments will be due one week after the experiment is completed, at 9:00am. A hard copy of the report, cover page and raw data are required. Experiments with raw data that cannot be presented on one page may be summarized (e.g., temperature vs time plots for the Unsteady State Heat Transfer experiment) and available via email to the instructor or TA upon request. The instructor or TA assigned to that particular laboratory will grade the report's technical information, including raw data, sample calculations, and all graphs/tables provided. The instructor will grade the report's quality of presentation (formatting, clarity, grammar) and quality of analysis (motivation of the study, discussion of the results). The technical and quality grades will be combined to constitute the report grade and will be returned one week after the report was submitted.

Reports receiving a grade of 79% or less must be rewritten and are due at 9:00am one week after the graded report is returned. Reports with a grade of $\geq 80\%$ may be rewritten if you wish. The instructor will indicate what sections of the report must be rewritten or what additions are necessary. The final grade for the report will be the average of the two grades. If you are required to rewrite a report (grade of $\leq 79\%$) and do not do so, a grade of 0% will be averaged with your original report grade.

Sample Schedule:

Week 1:	Complete experiment
Week 2:	Report due
Week 3:	Graded report returned
Week 4:	Revised report due
Week 5:	Graded revision report returned

Late reports: **Reports are due one week after the experiment is completed at the beginning the laboratory period. Any portion of a report submitted after 9:10am will be counted as one day late.** Late reports will be penalized 5 points per day. A report must be submitted for each completed experiment by 5pm on 5/18/12 to receive a passing grade in the course. Any reports turned in to the instructor's mailbox or under their office door must be signed and marked with date and time by a TA, departmental professor or staff. On weekends, an electronic copy may be submitted to the instructor to provide a time stamp and a hard copy provided by Monday at 9:00am.

Sample late penalties for a report due on a Thursday:

Report submitted before 9:10am on Thursday: no deduction
 Report submitted between Thursday 9:11am and Friday 9:10am: -5 points
 Report submitted between Friday 9:11am and Saturday 9:10am: -10 points, etc.

Final course grades will be assigned according to the "gap system". In other words, the final grade distribution for all students will be plotted and cut-offs for grades will be determined based on breaks in the distribution. Students with a 90+ course average will receive an A, an 80+ average will receive at least a B, 70+ at least a C, and a 60+ at least a D. For students whose final course scores are borderline between two letter grades, the higher or lower grade will be selected based on visits in office hours, attitude in the laboratory, ability to work with others, and whether graded performance has improved or declined during the semester.

Final course grades will be weighted as follows:		<u>For more information, see:</u>
Quizzes (6 total):	5%	Pre/Post Laboratory Handout
Post-lab memos (9 total):	5%	Pre/Post Laboratory Handout
Homework (3 total):	5%	Assigned during February
Reports on experiments (6 total):	75%	Report Booklet
Project:	10%	Project Booklet; assigned by 3/2/12

Course Policies:

The following course policies must be followed. At the discretion of the instructor or teaching assistants, non-compliance with course policies may negatively impact your final course grade. With the exception of plagiarism, students who do not comply with course policies will be sent one warning notice to the student's umbc.edu email address before final grades will be impacted. First instances of plagiarism may negatively impact your final course grade; in other words, no warnings will be given for plagiarism cases.

Attendance and Team Work: The experimental work is a team effort and all members of the group are expected to be present during each laboratory session. Work may not be started until all members of the group are in the laboratory. If an emergency arises, **YOU MUST INFORM THE INSTRUCTOR OR TEACHING ASSISTANT BEFORE CLASS** and arrangements will be made for the whole group to perform the experimental work at another time.

Laboratory work will be completed by the group. You are encouraged to do the calculations and preparation of the tables and figures together. However, **you are to write your own reports with no sharing of the written work.**

Preparation: During the laboratory period, examine the equipment you will use for the next experiment and ask the instructor or teaching assistants to review the procedure with you. Then, before coming to the laboratory, read the description of the experiment and relevant background material. For each experiment, be prepared to complete a short quiz covering the objective of work, theory, and procedure.

Academic Integrity: By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, course failure, suspension, or dismissal. To read the full Student Academic Conduct Policy, consult <http://www.umbc.edu/integrity>.

You are prohibited from using old reports and files from previous years. Adequate samples may be provided in class if requested.

You are prohibited from copying phrases, sentences and sections from any resources, including handouts, other students' work, text books, and websites. All resources, including figures downloaded from the internet, must be cited. See the Report Guidelines Booklet for more information.

Anyone who violates these policies is in automatic violation of departmental policy and the faculty will treat this as a case of academic misconduct. **Precedent exists for the 1-year delay of graduation for seniors who failed course(s) due to academic misconduct.**

Bottom line: Maintain high standards for your own work. Start work early so that the temptation to cut corners does not arise. Do not risk even the appearance of academic integrity violations. If you have any questions or concerns, do not hesitate to ask the instructor or teaching assistants.

Safety: Safety in the laboratory is tantamount to good laboratory practice. No rule, unless augmented with safety awareness and good sense, will protect you from accidents. The following practices will **ALWAYS** be exercised in the laboratory:

- The group is responsible for checking the experimental equipment before starting the experiment. Hazards must be eliminated before start-up.
- Report all injuries to the instructor or teaching assistant immediately, no matter how minor.
- Safety glasses must be worn in the laboratory at all times.
- Gloves are required for all experiments involving chemicals or biologicals.
- No smoking, eating or drinking in the laboratory. Close-toed shoes and shirts must be worn. No open-toed shoes. Long pants are encouraged.
- Operating equipment must not be left unattended. At least one member of the group should always be present.
- Laboratory work will not be permitted outside of regularly scheduled hours unless arrangements are made with the instructor or teaching assistants.

Lockers outside Eng 334B will be assigned during the first class period. Please use the lockers to store your bookbags, coats, and any food or drink. You may also wish to store close-toed shoes and long pants in your locker to wear while working in the laboratory.

Schedule:Friday Discussion (ACIV 108)

February	3	Data analysis
	10	Statistics
	17	Writing and critical thinking
	24	TBA
March	2	Project assigned
	9	Project: Debrief meetings
	16	Project: Home Team Report 1 due
	23	No class (Spring Break)
April	30	TBA
	6	Project: Debrief meetings
	13	TBA
	20	Project: Home Team Report 2 due
May	27	TBA
	4	TBA
	11	TBA

Lab Sessions (Eng 334B)

Jan 31, Feb 2	Pump lab (bring your fluids textbook), <i>Homework #1 due</i>
Feb 7 – May 1	Experiments (see schedule for your group)
May 3, 8	Make-up days
May 10	Project: Visiting Teams Run Experiments

Groups

- A: Earnest, Trankle
- B: Shimkevitch, Zhuo
- C: Faris, M Santos
- D: Gebreselassie, S Santos
- E: Davies, Velasquez
- F: Kirsch, Tilahun
- G: Courtney, Ojo
- H: Kang, Weston
- I: Mohr, Tran
- J: Le, Williams

ENCH 485L LAB SESSIONS

Team	7-Feb	9-Feb	14-Feb	16-Feb	21-Feb	23-Feb	28-Feb	1-Mar	6-Mar	8-Mar	13-Mar	15-Mar	27-Mar
A	BC1	BC2	BC3	Purif	Cell1	Cell2	Cell3	OFF	OFF	Enzyme	F/F	OFF	UnSS
B	BC1	BC2	BC3	Purif	Cell1	Cell2	Cell3	OFF	OFF	Enzyme	F/F	OFF	UnSS
C	BC1	BC2	BC3	OFF	OFF	Purif	UnSS	OFF	Cell1	Cell2	Cell3	OFF	OFF
D	OFF	BC1	BC2	BC3	OFF	Purif	UnSS	OFF	Cell1	Cell2	Cell3	OFF	OFF
E	F/F	BC1	BC2	BC3	Encap1	Encap2	Encap3	Encap4	Encap5	OFF	OFF	Purif	Cell1
F	F/F	BC1	BC2	BC3	Encap1	Encap2	Encap3	Encap4	Encap5	OFF	OFF	Purif	Cell1
G	UnSS	OFF	BC1	BC2	BC3	Enzyme	Encap1	Encap2	Encap3	Encap4	Encap5	OFF	F/F
H	UnSS	OFF	BC1	BC2	BC3	Enzyme	Encap1	Encap2	Encap3	Encap4	Encap5	OFF	F/F
I	OFF	OFF	BC1	BC2	BC3	OFF	F/F	OFF	OFF	Purif	OFF	Enzyme	Encap1
J	OFF	OFF	BC1	BC2	BC3	OFF	F/F	OFF	OFF	Purif	OFF	Enzyme	Encap1

Team	29-Mar	3-Apr	5-Apr	10-Apr	12-Apr	17-Apr	19-Apr	24-Apr	26-Apr	1-May	3-May	8-May	10-May
A	OFF	Encap1	Encap2	Encap3	Encap4	Encap5	OFF	OFF	OFF	OFF	make-up	OFF	VT run
B	OFF	Encap1	Encap2	Encap3	Encap4	Encap5	OFF	OFF	OFF	OFF	make-up	OFF	VT run
C	OFF	OFF	Enzyme	F/F	OFF	Encap1	Encap2	Encap3	Encap4	Encap5	make-up	OFF	VT run
D	OFF	OFF	Enzyme	F/F	OFF	Encap1	Encap2	Encap3	Encap4	Encap5	make-up	OFF	VT run
E	Cell2	Cell3	OFF	OFF	Enzyme	UnSS	OFF	OFF	OFF	OFF	make-up	OFF	VT run
F	Cell2	Cell3	OFF	OFF	Enzyme	UnSS	OFF	OFF	OFF	OFF	make-up	OFF	VT run
G	OFF	OFF	Purif	Cell1	Cell2	Cell3	OFF	OFF	OFF	OFF	make-up	OFF	VT run
H	OFF	OFF	Purif	Cell1	Cell2	Cell3	OFF	OFF	OFF	OFF	make-up	OFF	VT run
I	Encap2	Encap3	Encap4	Encap5	OFF	UnSS	OFF	Cell1	Cell2	Cell3	make-up	OFF	VT run
J	Encap2	Encap3	Encap4	Encap5	OFF	UnSS	OFF	Cell1	Cell2	Cell3	make-up	OFF	VT run

BC, Boot Camp
 F/F, Fixed and Fluidized Beds
 UnSS, Unsteady State Heat Transfer

Encap, Encapsulation, Release and Stability of Proteins
 Cell, Cell Culture and Microscopy
 Enzyme, Enzyme Kinetics
 Purification, Purification of Proteins

VT, Visiting Team (Project)

ENCH 485L DEADLINES All reports due at 9:00am regardless of your lab session schedule Updated 1/23/2012

Team	7-Feb	9-Feb	14-Feb	16-Feb	21-Feb	23-Feb	28-Feb	1-Mar	6-Mar	8-Mar	13-Mar	15-Mar	16-Mar	27-Mar
A						Purif (M)			Cell			Enzyme	HT1	F/F
B						Purif (M)			Cell			Enzyme	HT1	F/F
C								Purif (M)	UnSS				HT1	Cell
D								Purif (M)	UnSS				HT1	Cell
E			F/F							Encap			HT1	
F			F/F							Encap			HT1	
G			UnSS					Enzyme					HT1	F/F
H			UnSS					Enzyme					HT1	F/F
I									F/F			Purif (M)	HT1	
J									F/F			Purif (M)	HT1	

Team	29-Mar	3-Apr	5-Apr	10-Apr	12-Apr	17-Apr	19-Apr	20-Apr	24-Apr	26-Apr	1-May	3-May	8-May	17-May
A		UnSS						HT2	Encap					VT
B		UnSS						HT2	Encap					VT
C					Enzyme	F/F		HT2					Encap	VT
D					Enzyme	F/F		HT2					Encap	VT
E	Purif (M)			Cell			Enzyme	HT2	UnSS					VT
F	Purif (M)			Cell			Enzyme	HT2	UnSS					VT
G		F/F			Purif (M)			HT2	Cell					VT
H		F/F			Purif (M)			HT2	Cell					VT
I	Enzyme					Encap	UnSS	HT2					Cell	VT
J	Enzyme					Encap	UnSS	HT2					Cell	VT

BC, Boot Camp
 F/F, Fixed and Fluidized Beds
 UnSS, Unsteady State Heat Transfer
 Encap, Encapsulation, Release and Stability of Proteins
 Cell, Cell Culture and Microscopy
 Enzyme, Enzyme Kinetics
 Purification, Purification of Proteins
 VT, Visiting Team (Project)
 HT, Home Team (Project)