DEPARTMENT OF BIOMEDICAL ENGINEERING
INSTRUCTIONAL INCUBATOR
UNIVERSITY OF MICHIGAN

BME Course Summary

Introduction

1. Course Information

Course Name	BMEn 2101 – Biomedical Thermodynamics
Institution	University of Minnesota
Course Number	56815 (lec), 56890 (dis)
Number of Credits	3
Meeting Times	Tue/Thu 1:00pm – 2:15pm (lec), Mon 12:20pm – 1:10pm (dis)
Is this a required course?	Yes
Pre-requisites	BMEn 2501, CHEM 1022, MATH 2373, concurrent registration is required (or allowed) in MATH 2374
Target Audience (e.g., 1st, 2nd year)	2nd year
Textbook	Molecular Driving Forces. K.A. Dill and S. Bromberg
Course Website (if it exists)	webct.umn.edu

2. Course Description

In the space below, "paste" the description of the course. This can be the actual description listed in the syllabus from the course.

Introduction to thermodynamics with biological emphasis. First Law, Boltzmann distribution, reaction equilibrium, random walks, friction, diffusion in fluids, entropy, free energy, Maxwell relations, phase equilibria, chemical forces, self-assembly, cooperative transitions, molecular machines, membranes. Introduction to statistical mechanics.

3. Course Learning Objectives

In the space below, "paste" the course learning objectives if explicitly stated.

n/a

4. Fundamental Tools and Skills

In the space below, describe the fundamental tools and skills that are addressed in the class. For example, labvview, arduino's, the design process etc.

Critical thinking: A significant portion of the course involves critical analysis of figures and derivations from the text. Teamwork: Solutions to homework problems are worked out in groups. Groups submit a single copy of their work for grading.

5. Exercises or Experiential Projects of Interest

Exercise/Project	Project Overview	Learning Activities and Assessments	Required Resources for Project Completion
EXAMPLE	Students make pulse oximeters.	**Learning Activities** • Students will use resistors and a bread board to … • In a short essay assignment, students explain… **Assessment** • Students complete a laboratory report that explains …	Function generator, resistors, oscilloscope….
1. Discussion sections	Students participate in TA-led problem-solving sessions.	**Learning Activities** • Students will work out solutions to problems discussed in class. **Assessment** • Attendance will be taken. Unexcused absences will be taken into account in the assignment of a final grade.	Textbook, course website
2. Homework	Students work out solutions to problems in groups.	**Learning Activities** • Students will work out solutions to homework problems from the text in groups of 2-4 people. **Assessment** • Groups will submit a single copy of their work for grading.	Textbook, course website

6. Additional thoughts

If you have any other thoughts about this course, but have not been able to reflect it elsewhere in the document, please feel free to do so here.

This is the first “true BME” course that students take. Dr. Sachs runs this class with a strong emphasis on critical thinking, which often catches students off guard. A significant portion of the course involves critical analysis of figures and derivations from the text, which most students have had little experience with at this stage of their undergraduate education. Dr. Sachs has a unique teaching style that is meant to challenge his students. He clearly states his high expectations for his students early on, noting that subsequent BME courses will only be more challenging. While this approach may dissuade some students from pursuing BME, Dr. Sachs truly has his students’ best interests in mind. He is extremely passionate about the class and actively encourages his students to think outside of the box. While the course format is a standard lecture plus discussion, few classes have had such an impact on me personally.