UNIVERSITY OF ILLINOIS
College of Engineering
Department of Materials Science and Engineering
Spring 2020: MSE 402
KINETIC PROCESSES IN MATERIALS

Instructor
Pascal Bellon, 312D MSEB, 265-0284, bellon@illinois.edu

Lecture
Tu-Th 9:30 – 10:50 am, Room 103 Talbot Laboratory

Recitation
Tu 5:00 – 6:30 pm (103 Talbot):
Quizzes (5-5:45 pm): 2/4, 2/18, 3/31, 4/14, 4/28
Problem assignments due by 5 pm on: 1/31, 2/14 (CM1), 3/6, 3/27 (CM2), 4/10, 4/24
Problem reviews: 1/28, 3/3, 4/7, 4/21
Overview for computational modules: 2/11, 3/24

Office Hours
Pascal Bellon: 5 - 6 pm of regular office hours (see below) and by appointment
TA1: 5 - 7 pm, Wednesday, MSEB 305 (except Everitt 2101 on 1/29)
TA2: 5 - 6 pm, Wed & Thu, Cer 322 (computational modules)

Websites
https://compass2g.illinois.edu/; piazza.com/illinois/spring2020/mse402/home

Grading
1 midterm exam (Tuesday 3/10, 5-6:30 pm, MEB 100) = 20%
1 final exam (Monday 5/11, 7-10 pm, Noyes Lab 100) = 35%
In-class activities (iClicker, …) = 10%
Homework assignments (6, drop lowest) = 15%
Quizzes (5, drop lowest) = 20%

GRADING POLICY
You are expected to be fully aware of the Student Code section related to Academic Integrity
(http://studentcode.illinois.edu/article1_part4_1-401.html and
http://studentcode.illinois.edu/article1_part4_1-402.html). All infractions listed in the Student Code,
including cheating and plagiarism, will result in penalties in accordance with the Student Code. I will in
particular assume that you are well aware of what constitutes plagiarism.


Additional books (Grainger reserves):

- Phase transformations in metals and alloys, D. A. Porter and K. E. Easterling, 669.94P833p
- Diffusion in solids, P. G. Shewmon, 531.7SH5D1989
- Atom movements: Diffusion and mass transport in solids, J. Philibert, 530.415 P536D:E
- Kinetic Processes: Crystal Growth, Diffusion, and Phase Transitions in Materials, K. A.
  Jackson, 530.136J132k2010
- Kinetic theory in the earth sciences, A. C. Lasaga, 551.9L33k
- Mathematics of diffusion, J. Crank, 541.341C85M1979
- Physical Chemistry, R. J. Silbey, R. A. Alberty, 541.3A1148p2001
- Polymer Chemistry, P. C. Hiemenz, 547.7 H532p2007
Course Outline (29 sessions)

I. Introduction (1 session)
II. Review of thermodynamics (2)
III. Chemical reaction kinetics (3)
IV. Diffusion (8)
   a. Phenomenological treatment (3)
   b. Atomistic treatment (2)
   c. Diffusion in alloys (1)
   d. Diffusion in polymers and glasses (1)
   e. Diffusion in ionic compounds (1)
V. Interfaces (4)
   a. Surfaces and interfaces (2)
   b. Interfacial reactions (2)
VI. Phase Transformations (7)
   a. Nucleation and growth (3)
   b. Solidification (2)
   c. Spinodal decomposition (1)
   d. Displacive transformations (1)
VII. Microstructural evolutions (4)
   a. Capillarity and coarsening (2)
   b. Sintering and grain growth (2)

Specific points on iClicker

An iClicker remote is required for in-class participation. iClicker is a response system that helps me to gain real-time feedback and gives everyone a chance to participate in class. Your iClicker participation and answers will go toward your grade for in-class activities.

You may purchase any of the following models:
The original iClicker, iClicker +, iClicker 2
You may purchase the remote through the bookstore or through a variety of online vendors.

Register your clicker within Illinois Compass 2g:
In order to receive credit for your iClicker responses, you will need to register your iClicker remote no later than Friday January 31st. To register your iClicker, go to this course site in Illinois Compass 2g (https://compass2g.illinois.edu/) and click on the link at the left entitled “iClicker Registration”. Enter your iClicker Remote ID in the required field and click Submit. The remote ID is the series of numbers and letters found on the back of your i-clicker remote. If your Remote ID is faded or missing visit the Illini Union Bookstore (http://www.uofibookstore.illinois.edu/) – they can look it up for you.
Do not register your clicker on iClicker.com. If you do, I will not be able to match your responses with your name and you will not receive credit.