UNIVERSITY OF ILLINOIS
College of Engineering
Department of Materials Science and Engineering

Spring 2018: MSE 402
KINETIC PROCESSES IN MATERIALS

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

Teaching assistant
Tu-Th 9:30 – 10:50 am, Room 103 Talbot Laboratory
Tu 5:00 – 6:30 pm (103 Talbot):

Lecture
Quizzes (5-5:45 pm): 1/30, 2/13, 2/27, 4/3, 4/17

Recitation
Problem assignments due by 5 pm on: 2/9 (CM1), 2/23 (CM2), 3/9, 4/13, 4/27
Problem reviews: 1/23, 3/6, 3/27, 4/10, 4/24,
Overview for computational modules: 2/6, 2/20
Pascal Bellon: by appointment

Office Hours

Websites https://compass2g.illinois.edu/ ; https://piazza.com/illinois/spring2018/mse402/home

Grading
1 midterm exam (Tuesday 3/13, 5-6:30 pm) = 20%
1 final exam (Friday 5/11, 8-11 am) = 35%
In-class activities (i>clicker, … ) = 15%
Homework assignments (5, drop lowest) = 15%
Quizzes (5, drop lowest) = 15%

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
   Kinetics of materials, R. W. Balluffi, S. A. Allen, W. C. Carter, 620.11292B214k
   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 i>clicker

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

You may purchase any of the following models:
The original i>clicker, i>clicker +, i>clicker 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 i>clicker responses, you will need to register your i>clicker remote no later than Friday January 26th. To register your i>clicker, go to this course site in Illinois Compass 2g (https://compass2g.illinois.edu/) and click on the link at the left entitled “i>Clicker Registration”. Enter your i>clicker 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.