MATSCEN 7193.02 (class number 34841)

Introduction to “in-situ STEM/TEM”
Spring 2020

Instructor: Dr. Joerg Jinschek, Associate Professor
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Office hours: 113 CEMAS, by appointment

Schedule: Classes will take place
• in the second half of SP20 (7-week schedule, 7wk2)
• on Wednesday, 3:00 – 4:50pm (1 credit)
• in the CEMAS lecture theater

Prerequisites: Graduate standing in MSE/WE,
passed MSE 6741 or 7855, or permission by instructor.

Objectives:
Scanning / Transmission Electron Microscope (STEM/TEM) as a Lab
= how to turn the microscope into an in-situ experimental laboratory while
maintaining high resolution STEM/TEM imaging and spectroscopy
capabilities. [1]

Figure taken from [1]
• Develop the ability to utilize state-of-the-art materials characterization techniques to tackle complex problems in materials science.
• Introduce and develop an understanding of advanced topics in in-situ characterization, with an emphasis on in-situ scanning / transmission electron microscopy (STEM/TEM), such as in-situ, heating & cooling, mechanical testing, biasing, gas & liquid cell.
• Topics covered will include: introduction of the concept of structure-property-function in materials; introduction of dynamic STEM/TEM imaging and data acquisition; time resolution; electron beam / sample interaction effects; technical solutions to introduce in-situ stimuli, incl. pros & cons; in-situ vs operando; application in energy materials, functional materials, metals, soft materials, catalysis, corrosion, etc.

Course material: Required textbooks are available through the OSU library online services. Further reading materials and lecture notes will be available on CanvasCarmen.

Reference Books:
   PDF version is available through the OSU library online services
   https://link-springer-com.proxy.lib.ohio-state.edu/book/10.1007/978-3-319-26651-0
   PDF version is available through the OSU library online services
   https://link-springer-com.proxy.lib.ohio-state.edu/book/10.1007/978-3-319-22988-1

Grading: Grading is based on:
• Two sets of homework, at least one homework includes presentation on one research example related to the course topic (each 33.3%)
• Final letter grades will be determined also based on student’s contribution to in-class discussions (33.4%).
PLAGIARISM AND ACADEMIC INTEGRITY:

It is university policy to refer any and all suspected cases of academic misconduct to the university Committee on Academic Misconduct (COAM). As such, any violations of OSU or MSE rules on academic integrity will be reported. Further details are given below and in the MSE student guide.

Remember that sharing of documents/files or violation of the course rules will constitute a violation of academic integrity. Students agree that by taking this course, all required reports may be subject to submission for textual similarity review (via TurnItIn.com) for the detection of plagiarism; any instances of plagiarism found will be considered academic misconduct and reported to COAM. All papers submitted to TurnItIn will be included as source documents within their reference database solely for the purpose of detecting plagiarism of such papers. Use of the TurnItIn.com service is subject to the terms and conditions of use posted on the TurnItIn.com site.

ADDITIONAL INFORMATION ON ACADEMIC MISCONDUCT:

Academic integrity is essential for maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, OSU and the instructors in this course expect that all students have read and understand the University’s Code of Student Conduct, and that all students will complete all academic and scholarly assignments with fairness and honesty. Further information can be found at: http://oaa.osu.edu/coam.html

Academic misconduct may be found in any action that tends to distort the accurate assessment of any student’s individual accomplishments that are evaluated for the purpose of grading or conferring academic credit. Note that a student may be guilty of academic misconduct, for example, by cheating, copying, plagiarizing, or by allowing another student to cheat, copy, or plagiarize. Note also that the distortion applies, for example, to exams, homework assignments, and participation. To the extent that any class activity (for example: attendance or participation) is used for evaluation for the purpose of grading or conferring academic credit, falsifying or distorting such activity, or permitting another student to falsify or distort such activity, represents academic misconduct. Under university rules, the instructor or TA is obligated to report suspected violations of the Code of Student Conduct to the Committee on Academic Misconduct. Additional guidance about what represents academic integrity and misconduct, and related university-wide policies and procedures are available at the following locations:

http://oaa.osu.edu/coam/faq.html
http://oaa.osu.edu/coam/ten-suggestions.html
http://studentaffairs.osu.edu/info_for_students/csc.asp

If you are unclear about where “collaboration” ends and “cheating” begins, ASK THE INSTRUCTOR!!!
DISABILITY SERVICES:

Any student who feels s/he may need an accommodation based on the impact of a disability should contact the Office for Disability Services at 614-292-3307 in room 150 Pomerene Hall to coordinate reasonable accommodations for students with documented disabilities. (URL: http://www.ods.ohio-state.edu/). Advice on such matters is also available from:

Mark Cooper, Graduate Studies Coordinator, (614) 292-7280, cooper.73@osu.edu. Contact Mark concerning MSE graduate studies.

PLEASE TAKE CARE OF YOURSELF (MENTAL HEALTH STATEMENT):

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student’s ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing.

If you are or someone you know is suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life’s Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614--292--5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614-292-5766.

If you are thinking of harming yourself or need a safe, non-judgmental place to talk, or if you are worried about someone else and need advice about what to do, 24 hour emergency help is also available through the Suicide Prevention Hotline (Columbus: 614-221-5445 / National: 800-273-8255); or text (4hope to 741741); or at suicidepreventionlifeline.org