Schedule: Lecture/Hands-On: Tues/Thurs 12.30 pm – 1:50 pm CST; 4101 Materials Science and Engineering Building; *Office hours:* Thursdays, 2 – 3 pm CST; MSEB 408B (or request via CampusWire)

Instructor: André Schleife (schleife).

Course websites:

- Class schedule, lecture slides/recordings, links: MSE598 ML website

- Announcements, Online discussion forum: CampusWire

- Assignment deposit: GradeScope (Entry Code: BKJYJG)

Course Scope:

- Statistics in Python

- Machine learning models and their application to data

- Data sources, curation, management, and visualization

- Applications from recent research literature

Course Objectives: This course is an in-depth introduction into the use of machine-learning techniques in the field of materials science and necessary foundations will be discussed. Students will be able to

- curate and maintain data in databases, visualize data, and turn data into descriptors compatible with machine-learning models;

- use supervised, unsupervised, and reinforcement techniques on various data sets;

- use regression, classification, and deep learning models;

- critically review the scientific literature;

- explain their reasoning to their colleagues in small and large settings;

- work together with their colleagues in a professional, scientific manner.

Prerequisites: Basic familiarity with the following is expected:

- Materials Science (Structure of materials; Properties of materials; Materials Characterization)

- Computer Science (Programming and data structures (e.g. Python, C, C++, or MATLAB)

- Mathematics (Linear algebra; Statistics)

If you have any questions or concerns about this, please reach out to your professor.

Required Text: None, but reading papers/websites and videos to watch will be assigned for lectures beforehand.

Course evaluation: Your grade in this course is participation and attendance based and it is required to attend class. Attendance of each unit will be graded through a GradeScope assignment, filled out in class. Class participation on CampusWire will be graded, and it is expected that you ask two questions throughout the semester and answer two questions throughout the semester. Several of the units will involve hands-on sessions (check the "Notes/Assignments" column above) and it is required that you to submit a jupyter notebook of your activities, which will be graded.

If you cannot attend for any reason, this can be accommodated and details can be found in the **"Absences"** section of this syllabus. Filling out the attendance form while not attending class is *not* permitted and considered a violation of the Honor's code that will be pursued as such.

Grade Reporting: All assessment/attendance scores are stored on GradeScope . Any errors in grade reporting appearing in the gradebook must be reported within 1 week of the grade being posted in the gradebook or by the last day of class, whichever is earlier. If you have a missing grade, contact the instructor.

Online Discussion Forum: This class uses CampusWire for all communication between the instructor and students. You will receive an email invite to register and should let the instructor know if you have not received this email by the first day of class. The CampusWire link will take you to the current class page at any time. Official class announcements will be sent via CampusWire, so you must register with an email address that you regularly check. If you desire, you can post anonymously on CampusWire or make a private post just to the instructors (this should be done rather than emailing the professor directly). *Note that CampusWire should be used to communicate with your instructors, rather than email.*

Obtaining help: The main two ways to obtain help are online at CampusWire or attend office hours. You can of course also speak with your professor briefly after lecture. Please do not send emails for routine help or absences. In cases of emergencies related to exams (e.g., illness) you should email your professor at the earliest possible opportunity.

Disability-Related Accommodations: To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES, http://disability.illinois.edu) as soon as possible, and no later than Feb. 1. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 333-4603, e-mail disability or go to https://www.disability.illinois.edu. If you are concerned you have a disability-related condition that is impacting your academic progress, there are academic screening appointments available that can help diagnosis a previously undiagnosed disability. You may access these by visiting the DRES website and selecting "Request an Academic Screening" at the bottom of the page.

Plagiarism: Collaborative interaction in small groups is encouraged, but each student must submit a writeup themselves. Any verified incident of plagiarism will result in formal academic sanctions. Students are responsible for familiarizing themselves with the definition of and penalties for plagiarism in Section I-401 of the UIUC Student Code. Note that plagiarism includes "copying another student's paper or working with another person when both submit similar papers without authorization to satisfy an individual assignment".

Absences: Excused Absence Request Form: forms.illinois.edu/sec/666438157

1. Excuses from assessments will only be given in the following circumstances:

   (a) Illness.

   (b) Personal crisis (e.g., car accident, required court appearance, death of a close relative).

(c) Required attendance at an official UIUC activity (e.g., varsity athletics, band concert).

2. In all cases you must complete the online Excused Absence Request Form and upload a scan of the official written documentation explaining your absence.

3. In cases (a) or (b) an official excuse letter from the Dean on Duty must be submitted via the online form within 2 weeks of the due date of the missed assessment, but no later than May 1. In cases of extended or unusual illness, late submission of excuse documentation will be considered. See Student Assistance Center.

4. In case (c) an official letter from the designated university official must be submitted via the online form at least one week prior to the due date of the missed assessment.

5. Notwithstanding the above, at the professor's discretion you may be required to make up any excused work or attend substitute instruction or assessment.

Changes to syllabus: may occur as deemed necessary by the professor; they will be announced.

Calendar and Topics: Changes to schedule will be announced; see MSE598 ML website calendar for exact schedule, assignments, and to remain up to date.

Emergency Response Recommendations: Emergency response recommendations can be found at the following website:
http://police.illinois.edu/emergency-preparedness/. I encourage you to review this website and the campus building floor plans website within the first 10 days of class:
http://police.illinois.edu/emergency-preparedness/building-emergency-action-plans/.

Sexual Misconduct Reporting Obligation: The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX Office. In turn, an individual with the Title IX Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options.

A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: wecare.illinois.edu/resources/students/#confidential.

Other information about resources and reporting is available here: wecare.illinois.edu.

Academic Integrity: The University of Illinois at Urbana-Champaign Student Code should also be considered as a part of this syllabus. Students should pay particular attention to Article 1, Part 4: Academic Integrity. Read the Code at the following URL: http://studentcode.illinois.edu/.

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: https://studentcode.illinois.edu/article1/part4/1-401/. Ignorance is not an excuse for any academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor(s) if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

Religious Observances: Illinois law requires the University to reasonably accommodate its students' religious beliefs, observances, and practices in regard to admissions, class attendance, and the scheduling of

examinations and work requirements. You should examine this syllabus at the beginning of the semester for potential conflicts between course deadlines and any of your religious observances. If a conflict exists, you should notify your instructor of the conflict and follow the procedure at https://odos.illinois.edu/community-of-care/resources/students/religious-observances/ to request appropriate accommodations. This should be done in the first two weeks of classes.

Family Educational Rights and Privacy Act (FERPA): Any student who has suppressed their directory information pursuant to Family Educational Rights and Privacy Act (FERPA) should self-identify to the instructor to ensure protection of the privacy of their attendance in this course.
See https://registrar.illinois.edu/academic-records/ferpa/ for more information on FERPA.

Anti-Racism and Inclusivity Statement: The Grainger College of Engineering is committed to the creation of an anti-racist, inclusive community that welcomes diversity along a number of dimensions, including, but not limited to, race, ethnicity and national origins, gender and gender identity, sexuality, disability status, class, age, or religious beliefs. The College recognizes that we are learning together in the midst of the Black Lives Matter movement, that Black, Hispanic, and Indigenous voices and contributions have largely either been excluded from, or not recognized in, science and engineering, and that both overt racism and micro-aggressions threaten the well-being of our students and our university community.

The effectiveness of this course is dependent upon each of us to create a safe and encouraging learning environment that allows for the open exchange of ideas while also ensuring equitable opportunities and respect for all of us. Everyone is expected to help establish and maintain an environment where students, staff, and faculty can contribute without fear of personal ridicule, or intolerant or offensive language. If you witness or experience racism, discrimination, micro-aggressions, or other offensive behavior, you are encouraged to bring this to the attention of the course director if you feel comfortable. You can also report these behaviors to the Bias Assessment and Response Team (BART) (https://bart.illinois.edu/). Based on your report, BART members will follow up and reach out to students to make sure they have the support they need to be healthy and safe. If the reported behavior also violates university policy, staff in the Office for Student Conflict Resolution may respond as well and will take appropriate action.