

MATH 664 (601) — Topics in Mathematical Data Science *

MWF 02:55pm-03:45pm, Blocker Building, Room 124

Instructor: Simon Foucart, 502D Blocker Building, foucart@tamu.edu

Office hours: M 3:50pm-4:35pm, W 2:15pm-2:45pm, and by appointment

Course web page: accessed via eCampus at <http://ecampus.tamu.edu/>

Textbook: none; lecture notes will be distributed.

Course Content: The following topics will (tentatively) be covered:

- Machine Learning: general concepts, VC dimension, binary classification, support vector machines, regression, clustering, dimension reduction;
- Optimal Recovery: fundamental results, approximability models, optimal observations, tractability and curse of dimensionality;
- Compressive Sensing: sparse recovery, optimality, low-rank recovery, one-bit sensing, group testing;
- Optimization: basics, linear programming, semidefinite programming, duality, nonconvex optimization;
- Neural Networks: general concepts, expressiveness of shallow networks, the advantages of depth, training by back-propagation.

Prerequisite: Some basic knowledge of linear algebra, analysis, and probability; familiarity with a programming language is a plus.

Grading: Based on homework and class participation.

Electronic Etiquette: Cell phones must absolutely be put on silent mode, left closed, and put away. If you have a family emergency and need to take a call during class, I shall be notified in advance so that a special arrangement can be made.

Academic Honesty: *“An Aggie does not lie, cheat, or steal or tolerate those who do.”*

See <http://aggiehonor.tamu.edu> for more information.

Americans with Disabilities: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information, visit <http://disability.tamu.edu>.

*this syllabus is a general plan for the course; deviations announced in class may be necessary

Campus Safety Measures: To promote public safety and protect students, faculty, and staff during the coronavirus pandemic, Texas A&M University has adopted policies and practices for Fall 2020 to limit virus transmission. Students must observe the following practices while participating in face-to-face courses and course-related activities (office hours, help sessions, transitioning to and between classes, study spaces, academic services, etc.):

- Self-monitoring — Students should follow CDC recommendations for self-monitoring. Students who have a fever or exhibit symptoms of COVID-19 should participate in class remotely and should not participate in face-to-face instruction.
- Face Coverings — Face coverings (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain. Description of face coverings and additional guidance are provided in the Face Covering policy and Frequently Asked Questions (FAQ) available on the Provost website.
- Physical Distancing — Physical distancing must be maintained between students, instructors, and others in course and course-related activities.
- Classroom Ingress/Egress — Students must follow marked pathways for entering and exiting classrooms and other teaching spaces. Leave classrooms promptly after course activities have concluded. Do not congregate in hallways and maintain 6-foot physical distancing when waiting to enter classrooms and other instructional spaces.
- To attend a face-to-face class, students must wear a face covering (or a face shield if they have an exemption letter). If a student refuses to wear a face covering, the instructor should ask the student to leave and join the class remotely. If the student does not leave the class, the faculty member should report that student to the Student Conduct office for sanctions. Additionally, the faculty member may choose to teach that day's class remotely for all students.

Personal Illness and Quarantine: Students required to quarantine must participate in courses and course-related activities remotely and must not attend face-to-face course activities. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities.

Students experiencing personal injury or illness that is too severe for the student to attend class qualify for an excused absence (See Student Rule 7, Section 7.2.2.) To receive an excused absence, students must comply with the documentation and notification guidelines outlined in Student Rule 7. While Student Rule 7, Section 7.3.2.1, indicates a medical confirmation note from the student's medical provider is preferred, for Fall 2020 only, students may use the Explanatory Statement for Absence from Class form in lieu of a medical confirmation. Students must submit the Explanatory Statement for Absence from Class within two business days after the last date of absence.

Operational Details for Fall 2020 Courses: For more information, please review the website <https://provost.tamu.edu/Campus-Messages/Fall-2020-Courses-at-TAMU>.