UTTyler ENGINEERING

Department of Mechanical Engineering
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Uttyler.edu/engineering

MSEL/MENG 5312- Advanced Engineering Data Analytics
Course Syllabus

Semester / Year	Spring (2nd 7-week) 2026
Catalog Description	This course prepares students to collect, synthesize, and analyze data, and use advanced statistical methods combined with AI tools to build models and make decisions in engineering such as operations, risk management, and predictions. In addition, this course covers the use of various Machine Learning methods for data analytics to automate analytical model application.
Prerequisites	MATH 3351 or Approval of instructor.
Section Number	050 , 051 & 060
Instructor Name	Dr. M. A. Rafe Biswas
Contact Information	Email: mbiswas@uttyler.edu , Zoom ID: 9035666115 - https://uttyler.zoom.us/j/9035666115 , Office: HEC A214
Class Type / Instruction Mode / Location	060: Online Delivery 050 & 051:Room TBA
Class Time	N/A
Office Hours	WTh 11:30 to 1 pm or By appointment
No. of Credits	3 credits
Required Textbook	N/A
Optional References	• Data Mining and Business Analytics with R, by Johannes Ledolter; Publisher: Wiley (2013), ISBN-13: 978-1118447147; • Data Science and Machine Learning Mathematical and Statistical Methods, by Dirk P. Kroese, Zdravko I. Botev, Thomas Taimre, Radislav Vaisman
Additional Rules and Requirements	Microsoft Excel, R, Python or MATLAB by MathWorks, Inc. (available through virtual desktop – one.uttyler.edu and IT support) 1. Since the mechanical engineering program is designed to prepare students for professional practice, all submitted work (e.g., homework, lab reports, projects, presentations) is expected to meet professional standards. Work that does not reflect professional quality may be subject to grade reductions, even if professionalism is not explicitly listed in the grading rubric. 2. This course allows the use AI tools (such as ChatGPT and Copilot) in self-learning. Students will be notified as to when and how these tools will be used, along with guidance for attribution. Using AI tools outside of these parameters violates UT Tyler's Honor Code, constitutes plagiarism, and will be treated as such.

	http://journals.ieeeauthorcenter.ieee.org/wp-content/uploads/sites/7/IEEE_Reference_Guide.pdf
Evaluation Method	• Quizzes: 10% • Discussion: 20% • Assignments: 30% • Project Reports:40%
Grading Policy / Scale	Letter Grades, Scale: A: 90 - 100, B: 80 – 89, C: 70-79, D: 60 – 69, F: <60
Important Events / Dates	Census date: March 6 Last date to one or more courses for Second 7-Week Session: April 10 Final project report due: April 22 Final Exams, end of Second 7-week session – April 25
Attendance / Makeup policy / other rules	Attendance is expected per university policy. Attendance of lectures may be regularly checked using Canvas. Make-up exams or assignments if approved will be administered during finals week. No email submission of assignment(s). All assignments MUST be submitted to Canvas for grading. Student with SAR status should contact the UT Tyler Office of Student Accessibility and Resources for exam arrangements. Any minor violation of the Student Behavior by a student will result in a full letter grade reduction for each incident and any single major violation such as cheating and plagiarism by a student will result in automatic failing grading in the course. Late submissions of assignments, reports (e.g., if due at 11:59:00 pm, then any time after such as 11:59:30 pm is late) will result in 10 % deduction per day from the graded score until down to 10% remaining. Late or no submission for any exam results in automatic grade of zero. Questions involving knowledge covered in class will be answered if the student proves that they have tried to come up with the answer. Solution to homework and quizzes will not be given. However, students can work on the right solution by checking their work with the instructor. Grade appeal: grades can be appealed by sending a Canvas message in written or typed format and then meeting the instructor during office hours, but no later than a week after the grade has been posted. Moreover, students may appeal any grade reduction to the instructor if valid excuse with documentation is provided.

	Note: your final semester grade is based on the 10-point scale. No curving or scaling will be applied even if you receive borderline grade such as 79.99.
Course Learning Objectives / ABET & PEOs Relation	By the end of this course, students will be able to: 1. Plan and collect data using appropriately selected methods that serve relevant research objectives. 2. Conduct data analytics using scientific methods and provide logical explanations including potential relationships between quantitative data and real-world problems. 3. Select a suitable data analytics method based on understanding the concepts, scope, limitations, and potential issues with the selected method, including AI based tools and methods. 4. Apply different methods of data analytics and expand to machine learning then utilize outcomes to provide constructive guidance in decision making. 5. Solve problems and make decisions informed by advanced data analytics and machine learning tools.
Tentative Topics / Course Plans	• Processing the Information and Getting to Know Your Data • Data visualization • Supervised and Unsupervised Learning • Linear and Nonlinear Regression • Machine Learning • Random Forrest • Artificial Neural Network • Engineering predictive models
University Policies	https://www.uttyler.edu/offices/academic-affairs/files/syllabus-information-rev122025.pdf

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Course Schedule for 7 week session - https://www.uttyler.edu/academics/academic-calendar.php

Week of	Lecture Topic/Class Activity	Major Assignments due
1	Processing the Information and Getting to Know Your Data/Data visualization	
2	Linear Regression	***Module 2 Quiz***
3	Nonlinear Regression	***Module 3 Quiz***
4	Supervised Learning	***Module 4 Quiz***
5	Unsupervised Learning	***Module 5 Quiz***
6	Machine Learning	***Module 6 Quiz***
7	Engineering predictive models: Application	**Final Project Report**