

Maintenance of Mechatronic Systems

Spring 2021

Department of Engineering Technology and Management, ETME 3120, CRN 21897, 3 hrs

Instructor: Dr. Khalid Tantawi

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Course Website: <https://blog.utc.edu/khalid-tantawi/courses/etme-3120/>

Office Phone Number: 423-425-5778

Office Hours and Location: Wednesdays: 3:00 PM – 5:00 PM , Tuesdays: 4:20 PM – 7:00 PM Thursdays: 4:20 PM – 7:00 PM

Course Meeting Days, Times, and Location: Tuesdays and Thursdays 3:05 PM – 4:20 PM

Course Meeting Location: Engineering Building Room 401 (Labs in rooms 213 and 401)

Course Catalog Description: Fundamental maintenance principles from multidisciplinary engineering fields. Applied machine design, material selection, equipment reliability and predictive / preventive maintenance technologies are of special emphasis. Application of troubleshooting techniques to systems having combined mechanical and electrical actuation and sensing technologies. Prerequisites: ETME 3010.

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Course Outcomes:

1. To define Preventive and Predictive Maintenance
2. To define the reliability of a system
3. To apply statistical principles to find system reliability
4. To identify nondestructive and destructive testing techniques and methods.
5. To identify materials based on mechanical properties
6. To apply troubleshooting techniques to a mechatronics system
7. To design a mechanical system using mechanical principles.
8. To apply safety rules and procedures in system maintenance.

Recommended Course Textbook: Productivity and Reliability-Based Maintenance Management, Matthew Stephens, Purdue University Press, 2010

* All Lecture Notes and Video Recordings can be found on the course website

**This course was revised to reduce the cost of course materials for students with the assistance of an Affordable Course Materials grant in Summer 2020.

Required Course Materials: Safety glasses, Calculator, Notebook

Technology Skills Required for Course: Basic computer applications

Course Assessments and Requirements:

Quizzes: 15%
Labs: 20%
Project: 5%
Homeworks: 10%
Midterm Exam: 25%
Final Exam: 25%

Course Grading Policy:

90 – 100: A
80-89.99: B
70-79.99: C
60-69.99: D
Less than 60: F

Course and Institutional Policies

Campus Safety Policy: Due to COVID-19, there is a [campus safety policy](https://www.utc.edu/walker-center-teaching-learning/covid-19-safety-policy.php) (<https://www.utc.edu/walker-center-teaching-learning/covid-19-safety-policy.php>) for classes that meet on campus; please review this policy.

COVID-19 Absence Policy: Due to COVID-19, there is an [absence policy](https://www.utc.edu/walker-center-teaching-learning/covid-19-absence-policy.php) (<https://www.utc.edu/walker-center-teaching-learning/covid-19-absence-policy.php>) for Fall 2020.

Student Conduct Policy: UTC's Academic Integrity Policy is stated in the Student Handbook (<https://www.utc.edu/dean-students/student-handbook.php>).

Technology Support: If you have problems with your UTC email account or with UTC Learn (Canvas), contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

Student Technology: If you have technology needs to access your courses and/or complete course requirements in Canvas, [submit a request](https://new.utc.edu/information-technology/learning-from-home) (<https://new.utc.edu/information-technology/learning-from-home>) with Information Technology.

Student Accommodations: If you have accessibility and accommodation requests, contact the [Disability Resource Center](https://www.utc.edu/disability-resource-center/index.php) (<https://www.utc.edu/disability-resource-center/index.php>) at 423-425-4006 or email DRC@utc.edu.

Honor Code Pledge: I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.

Class and Course Attendance Policy:

- No make-up sessions will be given for absence without a documented reasonable excuse.
- **Attendance is very important.** Missing six classes/sessions or more may result in an F grade.
- It is your responsibility to regularly check your UTC Learn (Canvas) for announcements or emails, and your default UTC email address to be aware of any important/emergency notice about the course or class schedule.
- **Neatness counts.** Please submit neat homework and class work. Points may be taken off if your exam or work paper is unreadable or not neat and organized.
- You are encouraged to ask questions in the class, in my office, through email, or on the phone.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve learning experiences at UTC. Toward the end of the semester, you will be emailed links to course evaluations and you are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

UTC Bookstore: The UTC Bookstore will price match Amazon and [BN.com](https://www.bn.com) prices of the exact textbook - same edition, ISBN, new to new format, used to used format, and used rental to used rental format, with the same rental term. For more information, go to the [Bookstore Price Match Program](#) webpage, visit the bookstore, email sm430@bncollege.com or call 423-425-2184.

Tentative Course Calendar/Schedule:

Week of 1/18/2021: Lesson 1: Introduction

Week of 1/25/2021: Lesson 2 Statistical Applications

Week of 2/1/2021: Lesson 2 Statistical Applications

Week of 2/8/2021: Lesson 3 Troubleshooting and Preventive Maintenance

Week of 2/15/2021: Troubleshooting using the DKit Software

Week of 2/22/2021: Troubleshooting using the DKit Software

Week of 3/1/2021: Review, **Mid Term Exam**

Week of 3/8/2021: Lesson 4 Predictive Maintenance

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Week of 3/15/2021: Lesson 5 Nondestructive Testing and Evaluation

Week of 3/22/2021: Lesson 6 Destructive Testing and Intro to Materials

Week of 3/29/2021: Lesson 7 TPM

Week of 4/5/2021: Project Time, Quiz 2

Week of 4/12/2021: Case Study: Engineering System Design

Week of 4/19/2021: Review

Week of 4/26/2021: Final Exams

Note 1: This schedule may change. If changes are made, announcements will be made in advance regarding those changes. **It is your responsibility to conform to all announcements, changes, and additions made during the classes.**

Safety Rules and Measures:

It is extremely important to follow the safety guidelines before you start and during the lab sessions. Some of the rules and measures that you must take are listed below.

1. Wear safety glasses.
2. Remove watches, jewelry, rings, and ties.
3. If you have a long hair, you must tie it up or put it in a cap.
4. Avoid loose clothes, and remove jackets.
5. Wear short sleeves, or properly rolled-up long sleeves.
6. Wear heavy duty shoes.
7. Make sure the floor is dry before you start and stays dry during the lab session. Never start your lab session if the floor is wet or greasy.
8. **Familiarize yourself with the location of the emergency stop buttons** before you start your lab session.
9. Perform proper Lockout/Tagout procedures, and **inform other students around you and your group members, if you are working in a group, before you plug in or operate, or turn on an electrical equipment.**