

KINEMATICS AND DYNAMICS OF MACHINES

Name: Mark Wasikowski, PhD.

Office Number: N/A

Office Telephone Number: 817-280-7774 (Work Phone)

Email Address: markw@uta.edu

Course Number, Section Number, and Course Title: MAE 3318-001

Time and Place of Class Meetings: GS 109, TR 5:30 – 6:50

Office Hours: GS 109; TR 5-5:30

Pre-requisite: MAE 2323 – Dynamics

Course Website: www-woolf.uta.edu; **login name:** 3318wasikowski; **password** 82machics31.

Description of Course Content: Kinematics and Dynamics of Machines introduces the Mechanical Engineering student to the motion and interaction of machine elements. Fundamental concepts of statics, kinematics, and dynamics will be applied to the determination of the motion and interaction of machine elements, as well as forces acting on machines and mechanisms. Specific applications will be made to mechanisms such as rotating machinery, cams, gears, flywheels, and balancing. The objectives are to be able to synthesize mechanisms and machine elements for specified performance, and then analyze the given mechanism for position, velocity, accelerations, static loads, and dynamic loads. This course will also provide the mechanical engineering student the foundations necessary to enroll in MAE 4342, Machine Design.

Student Learning Outcomes: The student is expected to learn and be measured (graded) on his/her ability to learn and demonstrate proficiency in mechanism kinematics, graphical and analytical linkage synthesis, linkage position analysis, linkage velocity analysis, linkage acceleration analysis, and dynamic linkage force analysis.

Requirements: Attend lectures, complete all homework as assigned, and complete mid term and final exams.

Required Textbooks and Other Course Materials:

1. Design of Machinery, R.L. Norton, 4rd Edition (available from Bookstore)
2. Computer Aided Kinematics and Dynamics of Mechanical Systems: Basic Methods; Edward J. Haug: (1989) (Book out of print, PDF available from website.)
3. Theory of Machines and Mechanisms; J.J. Uicker, G.R. Pennock, and J.E. Shigley; (portions available from class website)

Descriptions of major assignments and examinations with due dates: Homework is assigned in class; either from the textbook or class handouts. Homework provides the student opportunities to learn through repetition and practice and is largely the students own thoughts and efforts; however, there is value in learning to study together in small groups. Students are encouraged to share their understanding of concepts with one another. However, copying will not help you understand material for the tests. Homework must be turned in on the due date, at the beginning of class; neat and stapled. **Even though homework only counts as 20% of your grade, all homework must be turned in by the last day of class to pass the course. Late tests and homework will receive a grade of zero without prior approval. Homework will usually be assigned on Tuesday's and collected at the beginning of class the following Tuesday. Homework is collected and graded by the course Teaching Assistant (TA)**

Grading Policy:

Homework	20%
Mid Term #1 – Graphical Kinematics – Closed Book	20%
Mid Term #2 – Analytical Kinematics – Open Book	20%
Mid Term #3 – Dynamics – Closed Book	20%
Final Exam – Comprehensive – Closed Book	20%
Attendance	P/F
Optional Individual Design Project (can replace 1 Mid Term grade)	--

Attendance Policy: Students are required to attend class. Class attendance / reading and participation are assessed thru periodic attendance.

Make-up Exam Policy: There are no Exams make-ups.

Drop Policy: Refer to university drop policy.

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 92-112 - The Rehabilitation Act of 1973 as amended. With the passage of federal legislation entitled *Americans with Disabilities Act (ADA)*, pursuant to section 504 of the Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens. As a faculty member, I am required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing faculty of their need for accommodation and in providing authorized documentation through designated administrative channels. Information regarding specific diagnostic criteria and policies for obtaining academic accommodations can be found at www.uta.edu/disability. Also, you may visit the Office for Students with Disabilities in room 102 of University Hall or call them at (817) 272-3364.

Academic Integrity: It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. "Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts." (Regents' Rules and Regulations, Series 50101, Section 2.2)

Student Support Services Available: The University of Texas at Arlington supports a variety of student success programs to help you connect with the University and achieve academic success. These programs include learning assistance, developmental education, advising and mentoring, admission and transition, and federally funded programs. Students requiring assistance academically, personally, or socially should contact the Office of Student Success Programs at 817-272-6107 for more information and appropriate referrals.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabi. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week.

Grade Grievance Policy: Refer to catalog.

Required Lecture & Reading Assignments

Class	Date	Tentative Lecture/Topic	Norton	Haung	Uicker
1	8/25	Introduction to Kinematics			
2	8/27	Grubler, Grashof & Math Review	1,2	2,3,9	1
3	9/1	Graphical Linkage Synthesis	3	5	11
4	9/3	Graphical Linkage Synthesis	3		11
5	9/8	Coupler Curves and Cognates	3		
6	9/10	Coupler Curves and Cognates	3		
7	9/15	Coupler Curves and Cognates	3		
8	9/17	Position Analysis	4	3	2
9	9/22	Position Analysis	4	3	2
10	9/24	Mid Term #1 – Closed Book – Graphical Kinematics			
12	9/29	Analytical Linkage Synthesis	5		
13	10/1	Velocity Analysis	6	3,5	3
14	10/6	Velocity Analysis	6	3,5	3
15	10/8	Acceleration Analysis	7	3,5	4
16	10/13	Acceleration Analysis	7	3,5	4
17	10/15	Dynamics Fundamentals	10	6	14
18	10/20	Dynamics Fundamentals	10	6	14
19	10/22	Dynamics Force Analysis	11	8	15,16
20	10/27	Dynamics Force Analysis	11	8	15,16
21	10/29	Mid Term #2 – Open Book - Analytical Kinematics			
22	11/3	Analytical Dynamics			
23	11/5	Vibration Analysis		8	17
24	11/10	Vibration Analysis		8	17
25	11/12	Special Topics – Cam Design	8		5
26	11/16	Special Topics – Cam Dynamics	15		20
27	11/19	Special Topics – Spatial Kinematics & Robotics		10,11,12	12,13
28	11/24	Mid Term #3 – Closed Book - Dynamics			
29	11/26	Thanksgiving – No Class			
30	12/1	Special Topics – Balancing, Gear Trains, Engines	9, 12 - 14		6,10,18-23
31	12/3	Special Topics – Balancing, Gear Trains, Engines	9, 12 - 14		6,10,18-23
32	12/7-11	Final Exam – Comprehensive – Closed Book			