ME 504 – Interior Ballistics

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Text: Carlucci, D., Jacobson, S., *Ballistics: The Theory and Design of Ammunition and Guns*, 3rd Ed. Taylor and Francis, New York, 2018.

Week	Date	Class Hours (2.5 hours)	Reading Assignment	Homework Problems	Reference Notes
1	9/3	Introduction to ballistics, discuss class content, discuss project and rules of engagement Nomenclature	Chapter 1	None	Nomenclature pp.1-50 Nomenclature Addendum pp. 1-21
2	9/10	Interior ballistics Ideal Gas Law Review Van der Waals Equation Review Combustion Thermodynamics	Chapter 2 – sections 2.1 to 2.6	Chapter 2, problems 1, 2, 4 through 7	Ideal Gas Law pp. 1-22 Van der Waals Equation pp. 1-8 Thermodynamics Review - Combustion pp. 1-46
3	9/17	Thermochemistry of Real Propellants Solid Propellant Combustion	Chapter 2 – section 2.7 Chapter 3 – section 3.1	Chapter 2, problems 11 through 16, 18, 19	Thermochemistry of Real Propellants pp. 1-13 Solid Propellant Combustion pp. 1-32
4	9/24	Interior Ballistics Fundamentals Propellant Behavior in a Gun Gun equation of State	Chapter 3 sections 3.2 – 3.3	Chapter 3, problems 1 through 3	Interior Ballistics pp. 1-43
5	10/1	Lagrange Approximations and Equations of Motion	Chapter 3 sections 3.4 – 3.5	Chapter 3, problems 4 through 6	Lagrange Gradient pp. 1-60
6	10/8	Lagrange Approximations and Equations of Motion (Cont'd) Issue Midterm Exam	Chapter 4 sections 4.1 – 4.7 and 4.9	none	Lagrange Gradient pp. 61-88 Muzzle Devices pp. 1-40
7	10/15	No class			
8	10/22	Frankle- Baer Simulation Projectile Design Practice Mid-term exam due	Chapter 4 sections 4.10 and 4.12	Chapter 4, problems 1 and 2	Frankle-Baer pp. 1-34Projectile Design pp. 1-49
9	10/29	Cartridge Case Design Practice Gun Tube Design Go over midterm	Chapter 4 sections 4.8 Chapter 5 sections 5.1 – 5.2	Chapter 4, problems 4 and 5	Ctrg Case Design pp. 1-24 Gun Tube Design pp. 1-20
10	11/5	Gun Dynamics	Chapter 4 section 4.11 Chapter 5 sections 5.3 – 5.4	Chapter 4, problem 3, 6 and 7	Gun Dynamics pp. 1-55
11	11/12	Black Powder and intermediate ballistics	n/a	n/a	Black Powder pp. 1-20 Intermediate ballistics pp. 1-30
12	11/19	No class			

13	11/26	Leaking Guns	none	none	Leaking guns pp. 1-92
14	12/3	Issue Final Exam			
15	12/10	Final Exam due			