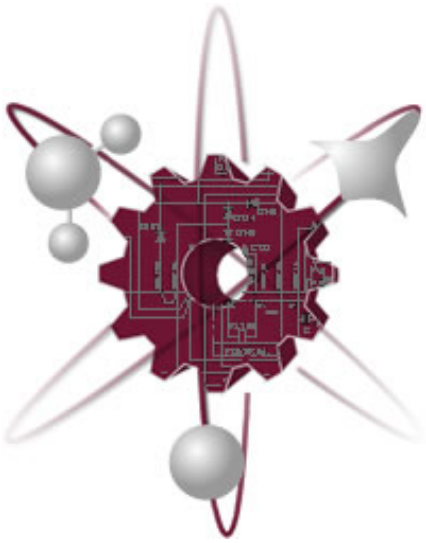
Appendix A: Syllabi

Engineering Physics

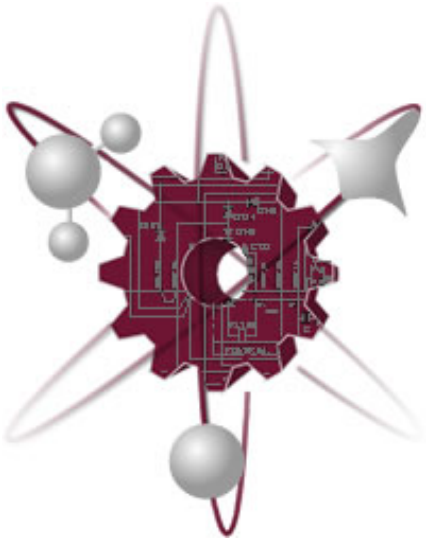
Bachelor of Science in Engineering Physics



Self-Study Report

New Mexico State University

Aerospace Engineering Courses



Course Information	**AE 339 Aerodynamics** 3 credits Required Spring 2012
INSTRUCTOR:	Dr. Shashikanth Office: JH611 Phone: 646-4348 email: shashi@nmsu.edu
ASSISTANTS:	NA
OFFICE HOURS:	1:30—3:30pm MW
CATALOG DESCRIPTION:	Fluid properties, conservation equations, incompressible 2-demensional flow; Bernoulli's equation; similarity parameters; subsonic aerodynamics: lift and drag, analysis and design of airfoils.
PREREQUISITES:	ME 237
COREQUISITES	M E 328, C E 301
TEXT:	*Munson, Bruce R., Young, Donald F.,Okiishi, H. & Huebsch, W.W., Fundamentals of Fluid Mechanics, 6th ed., John Wiley, 2009.* Supplemental Text: *Anderson, John D., Fundamentals of Aerodynamics, 3rd ed., McGraw-Hill, 2006.*
CLASS SCHEDULE:	Lecture: 10:30 a.m. - 11:20 a.m. - MWF - JH 204
GRADES:	Homework: 15% Four exams: 45% (total) Class Participation: 5% Final: 35%
COURSE OBJECTIVES:	<u>Develop a basic proficiency in</u> • Flow kinematic concepts—streamlines, vorticity and circulation (a,e). • Bernoulli's equation (a,e) • Potential flow theory (a,e) • Applications of mass and momentum conservation laws to fluid mechanics problems (a,e). • Applications of dimensional analysis and dynamic similitude (b,e). • Use of aerodynamic lift and drag coefficients(c,e).

Course Information	**AE 339 Aerodynamics** 3 credits Required Spring 2012
TOPICS COVERED:	• Review of Vector Calculus, Part A • Fluid Statics • Flow Kinematics • Bernoulli's Equation • Laplace's equation and potential flows • Review of Vector Calculus, Part B • Control Volume analysis • Similitude, Dimensional Analysis and Modeling • Aerodynamic lift and drag coefficients
RELATIONSHIP TO PROGRAM EDUCATIONAL OBJECTIVES:	A mastery of the fundamentals of mechanical engineering D ability to formulate, analyze, and creatively participate in the solution of multidisciplinary problems through use of modern engineering
RELATIONSHIP TO PROGRAM OUTCOMES:	a ability to apply knowledge of mathematics, science, and engineering b ability to design and conduct experiments, as well as to analyze and interpret data c ability to design a system, component or process to meet desired needs within realistic constraints e ability to identify, formulate, and solve engineering problems
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC2 1 year math and basic science PC3 1 1/2 years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	ME2 ability to apply advanced mathematics through multivariate calculus and differential equations ME3 familiarity with statistics and linear algebra
POLICIES:	• HWs are due back on the date specified. **No late HWs will be accepted** • HW solutions will be posted on bulletin board outside my office. • Credit (either a make-up or an average score based on all your other quizzes and exams) for any missed exam or quiz will be given only if: o You inform me before the start o the exam or quiz AND o You produce a written signed document giving a valid excuse for your absence. **Otherwise, you will get a zero for the exam missed.**
AUTHOR/DATE:	B. Shashikanth January 2012

Course Information	**AE 362 Orbital Mechanics** 3 credits Required Spring 2012
INSTRUCTOR:	Dr. D. Westpfahl Office: NMT Phone: 835-5792 email: dwestpfa@nmt.edu
ASSISTANTS:	NA
OFFICE HOURS:	by email
CATALOG DESCRIPTION:	Dynamics of exoatmospheric flight of orbiting and non-orbiting bodies; 2-body orbital dynamics and Kepler's laws; orbits in 3 dimensions; orbit determination; orbit design and orbital maneuvers; lunar and interplanetary trajectories.
PREREQUISITES:	MATH 392 and ME 237
TEXT:	*Fundamentals of Astrodynamics by Roger R. Bate, Donald D. Mueller, and Jerry E. White (Dover 1971).*
CLASS SCHEDULE:	Lecture: 8:00 a.m. - 9:15 a.m. - MW – JH604
GRADES:	Grading: Grades will be based on performance on homework and class projects.
COURSE OBJECTIVES:	• Our goal is to master the course content well enough to go on to graduate study or work in the aerospace industry. This is a first course in orbital mechanics. It will allow you to calculate orbits from observations and to participate in the planning of orbital and suborbital missions. Students will become conversant in these subjects, but it is impossible to become an expert in a single course.
TOPICS COVERED:	• Newtonian mechanics and Newtonian gravitation • Constants of the motion and the trajectory equation • Energy • Angular momentum • Coordinate systems for the study of orbits • Basic orbital maneuvers • Space vehicle positions and velocities • Trajectories
RELATIONSHIP TO PROGRAM EDUCATIONAL OBJECTIVES:	A mastery of the fundamentals of aerospace engineering
RELATIONSHIP TO PROGRAM OUTCOMES:	a ability to apply knowledge of mathematics, science, and engineering e ability to identify, formulate, and solve engineering problems k ability to use the techniques, skills and modern tools necessary for engineering practice

Course Information	**AE 362 Orbital Mechanics** 3 credits Required Spring 2012
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 1 1/2 years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	AE1 knowledge covering aeronautical or astronautical engineering areas AE2 knowledge of some topics from area not emphasized
POLICIES:	• Students are expected to attend class. Acceptable reasons for missing class include illness, travel to visit grad schools, personal or family emergencies, special research opportunities, and field trips for work in other classes. • We will use an Orbital Mechanics Concept Inventory at the beginning and end of the semester for assessment. • The class is paced to cover most of the text in one semester. This is a rate that accommodates most students. If you find this pace too slow please let me know; I am willing to provide the assignments and allow you to work at a more rapid pace. • Students are encouraged to work together. I will be available for help during office hours, after class meetings, and at other times by appointment. Informal drop-in visits to my office are strongly encouraged.
AUTHOR/DATE:	D. Westpfahl January 2012

Course Information	**AE 363 Aerospace Structures** 3 credits Required Spring 2012
INSTRUCTOR:	Dr. Young Lee Office: JH610 Phone: 646-7457 email: younglee@nmsu.edu
ASSISTANTS:	NA
OFFICE HOURS:	10:20 a.m.- 12:00 p.m. TR or by appointment
CATALOG DESCRIPTION:	Advanced concepts of stress and strain, introduction to the analysis of aero structures, complex bending and torsion, thin walled sections and shells, computational techniques.
PREREQUISITES:	CE 301
TEXT:	*Analysis of Aircraft Structures – An Introduction, 2nd Edition, Bruce K. Donaldson, Cambridge Aerospace Series, 2008*
CLASS SCHEDULE:	Lecture: 9:30 a.m. - 10:20 a.m. - MWF - JH 209
GRADES:	Homework 10% Midterm exam 40% Final exam 35% Class project 15%
COURSE OBJECTIVES:	<u>After completing this course, a student should be able to:</u> • Formulate and solve some fundamental linearly-elastic problems; • Apply basic failure theory and perform thermal shock analysis for composite materials; • Perform simplified dynamic loading analysis on aerospace structures; • Calculate various area properties for nonhomogeneous cross-sections of a beam, and their principal values and directions; • Understand the formulations of stresses/strains/deflections in a beam under various loading and boundary conditions.
TOPICS COVERED:	• Fundamental theory of elasticity (stress-strain relations through linearly elastic material behavior, and structural deformation under compatibility conditions) • simplified failure analysis of composite materials • dynamic loading analysis (fatigue/impact design) • thermal shock analysis • stresses, strains and deflections in a beam with closed/open, homogeneous/nonhomogeneous cross-sections under various (longitudinal/transverse, bending, torsional, buckling) loading/boundary conditions

Course Information	**AE 363 Aerospace Structures** 3 credits Required Spring 2012
RELATIONSHIP TO PROGRAM EDUCATIONAL OBJECTIVES:	A mastery of the fundamentals of aerospace engineering
RELATIONSHIP TO PROGRAM OUTCOMES:	a ability to apply knowledge of mathematics, science, and engineering e ability to identify, formulate, and solve engineering problems k ability to use the techniques, skills and modern tools necessary for engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 1 1/2 years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	AE1 knowledge covering aeronautical or astronautical engineering areas AE2 knowledge of some topics from area not emphasized
POLICIES:	• Lectures will be self-contained so textbooks might not need to be purchased; and all the relevant materials will be posted on Blackboard. • Team efforts are allowed and strongly recommended for homework and the class project. • Homework will be taken up at the beginning of class on the due date. Late homework will be accepted but with a penalty of 20% reduction within a day and 50% within a week. Those submitted longer than a week after the due date will not get any credit. • All exams will be closed-book with the relevant equations being provided. In principle, make-up exams will not be provided. • Final letter grades will be on a curve. • A team class project will require a final report. Details of project will be posted before the Midterm Exam 1. • Other remarks: o Any person caught plagiarizing or cheating in this course will get the letter grade F, regardless of their previous grade. For the University definition of plagiarism, see the Student Code of Conduct at http://www.nmsu.edu/~vpsa/SCOC/intro.html). o Students with disabilities: Feel free to contact Diana Quintana (Director, University Disability Services; diquinta@nmsu.edu or 575-646-2400) with any questions on student issues related to the Americans with Disabilities Act and/or Section 504 of the Rehabilitation Act of 1973. All medical information will be treated confidentially.
AUTHOR/DATE:	Y. Lee January 2012

Course Information	**AE 364 Flight Dynamics and Controls** 3 credits Required Spring 2012
INSTRUCTOR:	Dr. Young Lee Office: JH610 Phone: 646-7457 email: younglee@nmsu.edu
ASSISTANTS:	NA
OFFICE HOURS:	10:20 a.m.- 12:00 p.m. TR or by appointment
CATALOG DESCRIPTION:	Fundamentals of airplane flight dynamics, static trim, and stability; spacecraft and missile six degree of freedom dynamics; attitude control of spacecraft.
PREREQUISITES:	Math 392, ME 237
TEXT:	*Flight Stability and Automatic Control, 2nd ed., Robert C. Nelson, McGraw-Hill, 1998*
CLASS SCHEDULE:	Lecture: 8:55 a.m. - 10:10 a.m. - TR - JH 205
GRADES:	Homework 10% Midterm exam 40% Final exam 35% Class project 15%
COURSE OBJECTIVES:	<u>After completing this course, a student should be able to:</u> • Understand static stability design for longitudinal/lateral/directional flights; • Use the 6-degree-of-freedom, rigid body equations of motion of an aircraft; • Evaluate longitudinal/lateral/directional dynamic stabilities of an airplane; • Implement some control theories for autopilot design; • Learn various tools to carry out projects that require computer simulations.
TOPICS COVERED:	• Preliminaries: Laplace transformation, block diagram, transfer function, etc.; • Static stability and control: Longitudinal/directional/lateral stabilities; • Aircraft equations of motion: 6-DOF model, Euler angles, stability derivatives; • Longitudinal motions: Phugoid/short-period modes; • Lateral/directional motions: Spiral/rolling/Dutch-roll modes; • Automatic control theory for aircraft autopilot designs.
RELATIONSHIP TO PROGRAM EDUCATIONAL OBJECTIVES:	A mastery of the fundamentals of aerospace engineering B ability to formulate, analyze, and creatively participate in the solution of multidisciplinary problems through use of modern engineering

Course Information	**AE 364 Flight Dynamics and Controls** 3 credits Required Spring 2012
RELATIONSHIP TO PROGRAM OUTCOMES:	a ability to apply knowledge of mathematics, science, and engineering e ability to identify, formulate, and solve engineering problems k ability to use the techniques, skills and modern tools necessary for engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 1 1/2 years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	AE1 knowledge covering aeronautical or astronautical engineering areas AE2 knowledge of some topics from area not emphasized
POLICIES:	• Lectures will be self-contained so textbooks might not need to be purchased; and all the relevant materials will be posted on Blackboard. • Use of Matlab will be strongly encouraged for performing numerical simulations and verifying your analysis. • Team efforts are allowed and strongly recommended for doing homework and the class project. • Homework will be taken up at the beginning of class on the due date. Late homework will be accepted but with a penalty of 20% reduction within a day and 50% within a week. Those submitted longer than a week after the due date will not get any credit. • All exams will be closed-book with the relevant equations being provided. In principle, make-up exams will not be provided. • Final letter grades will be on a curve. • A team class project will require a final report and a model airplane with stability demonstration. Details of project will be posted before the Midterm Exam 1. • Other remarks: o Any person caught plagiarizing or cheating in this course will get the letter grade F, regardless of their previous grade. For the University definition of plagiarism, see the Student Code of Conduct at http://www.nmsu.edu/~vpsa/SCOC/intro.html). o Students with disabilities: Feel free to contact Diana Quintana (Director, University Disability Services; diquinta@nmsu.edu or 575-646-2400) with any questions on student issues related to the Americans with Disabilities Act and/or Section 504 of the Rehabilitation Act of 1973. All medical information will be treated confidentially.
AUTHOR/DATE:	Y. Lee January 2012

Course Information	**AE 419 Propulsion** 3 credits Required Spring 2012
INSTRUCTOR:	Dr. Chunpei Cai Office: JH515 Phone: 646-7704 email: ccai@nmsu.edu
ASSISTANTS:	NA
OFFICE HOURS:	9:30 a.m.- 12:00 p.m. MWF or by appointment
CATALOG DESCRIPTION:	Propulsion systems, thermodynamic cycles, combustion, specific impulse; principles of gas turbines, jet engines, and rocket propulsion systems.
PREREQUISITES:	AE 439
TEXT:	*Mechanics and Thermodynamics of Propulsion, Hill & Peterson, Addison-Wesley, 1992*
CLASS SCHEDULE:	Lecture: 1:10 p.m. - 2:25 a.m. - TR - JH 203
GRADES:	Quizzes 5% Homework 25% Midterm exam 30% Final exam 40%
COURSE OBJECTIVES:	<u>After completing this course, a student should be able to:</u> • Identify & summarize major differences/rationales among different propulsion systems. • Apply principles of mass, momentum and energy to component sections of propulsion. • Evaluate the efficiency and thruster for major propulsion systems.
TOPICS COVERED:	• Introduction & Review of Fundamental Aero/Thermal Sciences • General Introduction to Air-Breathing Engines • Inlet, nozzle, combustor, axial compressor and axial turbines • Introduction to Rocket Engines
RELATIONSHIP TO PROGRAM EDUCATIONAL OBJECTIVES:	A mastery of the fundamentals of aerospace engineering B ability to formulate, analyze, and creatively participate in the solution of multidisciplinary problems through use of modern engineering
RELATIONSHIP TO PROGRAM OUTCOMES:	a ability to apply knowledge of mathematics, science, and engineering e ability to identify, formulate, and solve engineering problems

Course Information	**AE 419 Propulsion** 3 credits Required Spring 2012
	k ability to use the techniques, skills and modern tools necessary for engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 1 1/2 years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	AE1 knowledge covering aeronautical or astronautical engineering areas AE2 knowledge of some topics from area not emphasized
POLICIES:	**Homework** • Homework will be assigned in class in Friday. Completed homework must be turned in before 5:00pm the following Friday. Graded homework will be returned next Monday after they are turned in along with the solution set attached to your returned homework. Late homework turned in before the solution set is given out will earn a maximum of 60% of the full score. Late homework after the solution set is given out will not be accepted. Discussions among classmates on homework are allowed, but students must finish their own homework by themselves. Copying classmates' homework solution is considered serious cheating. **Exams** • One midterm and one final: time, date, place, content and format are TBD. Must sign pledge: "During this exam, I have neither given nor received any aids to/from other people." **How to do well:** • turn in hw; discuss with friends; study example test problems and solutions carefully; always stop by to ask questions if you are not sure about the answers. **Students with Disabilities** • If you have or believe you have a disability, you may wish to self-identify. You can do so by providing documentation to the Office for Services for Students with Disabilities, located at Corbett Center, room 244. Their phone number is 646-6840. Appropriate accommodations may then be provided for you. If you have a condition which may affect your ability to exit safely from the premises in an emergency or which may cause an emergency during class, you are encouraged to discuss this in confidence with the instructor and/or the director of Disabled Student Programs. If you have general questions about the Americans With Disabilities ACT (ADA), call 646-3333. As an instructor I will receive specific written guidelines for appropriate accommodations for individual students from the Coordinator of Disabled Student Programs. Students will be given accommodations for disabilities as requested by the Coordinator.
AUTHOR/DATE:	C. Cai January 2012

Course Information	**AE 428 Aerospace Capstone Design** 3 credits Required Spring 2012
INSTRUCTOR:	Dr. Young H. Park Office: JH615 Phone: 646-3092 email: ypark@nmsu.edu
ASSISTANTS:	To be announced
OFFICE HOURS:	8:00 a.m.- 9:00 p.m. MTWRF or by appointment
CATALOG DESCRIPTION:	Team Project-analysis, design, hands-on build test, evaluate.
PREREQUISITES:	AE 424
TEXT:	*NA*
CLASS SCHEDULE:	Lecture: 3:30 p.m. - 6:20 p.m. - M - HA 104 3:30 p.m. - 6:20 p.m. - W - JH 283
GRADES:	Class Participation: 20% Individual & team performance: 30% Group Deliverable: 50%
COURSE OBJECTIVES:	• Have experience functioning as mechanical engineer within an engineering design and development group. (d) • Complete a real-life design task – transform a client's needs into a tangible, tractable project definition, and see the project through to completion. (c) • Understand and use a formal engineering design method, with emphasis on building concurrent engineering procedures into the basic design method. (c) • Become proficient in collaboratively preparing and reviewing formal technical design package related to an engineering design including final design binder and report (g)
TOPICS COVERED:	• Participation in a project team • Use of technical tools from past engineering courses • Strengthening of teaming skills • Learning how to apply engineering fundamentals to the design
RELATIONSHIP TO PROGRAM EDUCATIONAL OBJECTIVES:	B ability to formulate, analyze, and creatively participate in the solution of multidisciplinary problems through use of modern engineering C ability to communicate clearly and effectively with fellow engineers, employers and general public D skills needed to fulfill professional duties and responsibilities in teamwork, collegiality, ethics, technical leadership, etc.

Course Information	**AE 428 Aerospace Capstone Design** 3 credits Required Spring 2012
RELATIONSHIP TO PROGRAM OUTCOMES:	c ability to design a system, component or process to meet desired needs within realistic constraints d ability to function on multidisciplinary teams g ability to communicate effectively
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC1 major design experience PC3 1 1/2 years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	AE1 knowledge covering aeronautical or astronautical engineering areas AE3 design competence
POLICIES:	• None
AUTHOR/DATE:	Y. Park January 2012

Course Information	**AE 424 Aerospace Systems Engineering** 3 credits Required Spring 2012
INSTRUCTOR:	Dr. Ou Ma Office: JH111 Phone: 646- 6534 email: oma@nmsu.edu
ASSISTANTS:	Angel Flores-Abad
OFFICE HOURS:	9:30 a.m.- 12:00 p.m. MWF or by appointment
CATALOG DESCRIPTION:	Basic principles of top down systems engineering and current practice; preliminary and detailed design of aircraft and space vehicles, including requirement, subsystem interaction, and integration, tradeoffs, constraints and non-technical aspects.
PREREQUISITES:	AE 362, JR status
TEXT:	Instead of a single textbook, the following materials and reference will be used: • Lecture presentations and notes • NASA Systems Engineering Materials: http://spacese.spacegrant.org/ • *Systems Engineering and Analysis, Blanchard and Fabrycky, 4th edition, 2006* • *An Introduction to General Systems Thinking, Gerald M. Weinberg, 2001*
CLASS SCHEDULE:	Lecture: 10:20 a.m. - 11:35 a.m. - TR - JH 205
GRADES:	Homework 25% Case study project 25% Quizzes 20% Final exam 30%
COURSE OBJECTIVES:	• to Introduce the fundamentals of systems engineering theory and practice • to establish the knowledge and comprehension of the value and purpose of systems engineering principles and process • to establish a working knowledge of the methods and tools systems engineers use • to understand the roles of systems engineers and develop the ability contributing to the development of complex aerospace systems
TOPICS COVERED:	• Concepts and theory of systems science and engineering • Requirements development • System design fundamentals and process • Design analysis and optimization • System evaluation, verification and validation • Systems engineering management • Engineering ethics

Course Information	**AE 424 Aerospace Systems Engineering** 3 credits Required Spring 2012
RELATIONSHIP TO PROGRAM EDUCATIONAL OBJECTIVES:	B ability to formulate, analyze, and creatively participate in the solution of multidisciplinary problems through use of modern engineering C ability to communicate clearly and effectively with fellow engineers, employers and general public D skills needed to fulfill professional duties and responsibilities in teamwork, collegiality, ethics, technical leadership, etc.
RELATIONSHIP TO PROGRAM OUTCOMES:	c ability to design a system, component or process to meet desired needs within realistic constraints d ability to function on multidisciplinary teams g ability to communicate effectively
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC1 major design experience PC3 1 1/2 years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	AE1 knowledge covering aeronautical or astronautical engineering areas AE2 knowledge of some topics from area not emphasized AE3 design competence
POLICIES:	• Since class discussion is a very important method of learning for this course, class participation will be one of the determining factors for grading. • A quiz may be given in each class. A missing quiz cannot be made up later unless the absence was notified to the instructor in advance. • Homework assignments submitted passed the dues dates will receive no credits unless permitted by the instructor.
AUTHOR/DATE:	O. Ma January 2012

Course Information	**AE 439 Aerodynamics II** 3 credits Required Spring 2012
INSTRUCTOR:	Dr. Fangjun Shu Office: JH629 Phone: 646- 2118 email: shu@nmsu.edu
ASSISTANTS:	Jonathan A. Alcantar (grader)
OFFICE HOURS:	1:00 p.m.- 3:00 p.m. T 2:00 p.m.- 4:00 p.m. R or by appointment
CATALOG DESCRIPTION:	Principles of compressible flow, momentum and energy conservation; thermal properties of fluid; supersonic flow and shock waves; basics of supersonic aerodynamics.
PREREQUISITES:	AE 339, ME 240
TEXT:	*Fundamentals of Aerodynamics, 4th ed., John D. Anderson, Jr.*
CLASS SCHEDULE:	Lecture: 10:30 a.m. - 12:20 a.m. - MWF - JH 103
GRADES:	Homework 20% 2 midterm exams (25% ea.) 50% Final exam 30%
COURSE OBJECTIVES:	<u>After completing this course, a student should be able to:</u> • Apply mass, momentum and energy conservation laws to aerodynamics problems. • Develop concepts of compressible flow, shock and expansion waves. • Solve isentropic, Fanno-line and Rayleigh-line flows in nozzle and gas pipeline design. • Calculate the lift, drag and moment characteristics of thin airfoils and finite wings under both subsonic and supersonic flow regimes.
TOPICS COVERED:	• Review of fluid mechanics for application to aerodynamics. • Conservation laws – mass, momentum and energy. • Inviscid, compressible flow is developed and applied to normal and oblique shocks, and expansion waves. • Compressible flow theory is applied to nozzles, diffusers, and wind tunnels. • Internal compressible flows – Fanno- and Rayleigh- line flows • Inviscid, incompressible flow with application of potential and stream functions. • Incompressible flow over airfoils. Concepts of center-of pressure and aerodynamic center are developed. • Induced drag and Prandtl's lifting-line are developed along with solution methods for finite wings.

Course Information	**AE 439 Aerodynamics II** 3 credits Required Spring 2012
	• Subsonic and supersonic compressible flow is applied to airfoils using linear theory.
RELATIONSHIP TO PROGRAM EDUCATIONAL OBJECTIVES:	C ability to communicate clearly and effectively with fellow engineers, employers and general public D skills needed to fulfill professional duties and responsibilities in teamwork, collegiality, ethics, technical leadership, etc.
RELATIONSHIP TO PROGRAM OUTCOMES:	a ability to apply knowledge of mathematics, science, and engineering e ability to identify, formulate, and solve engineering problems k ability to use the techniques, skills and modern tools necessary for engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 1 1/2 years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	AE1 knowledge covering aeronautical or astronautical engineering areas
POLICIES:	• None
AUTHOR/DATE:	F. Shu January 2012

Course Information	**AE 447 Aerofluids Laboratory** 3 credits Required Spring 2012
INSTRUCTOR:	Bashar Qawasmeh Office: JH104 Phone: 646-6252 email: bashar@nmsu.edu
ASSISTANTS:	NA
OFFICE HOURS:	10:00 a.m.- 11:00 p.m. MW or by appointment
CATALOG DESCRIPTION:	Use of subsonic wind tunnels and other flow to study basic flow phenomena and methods of fluid measurement and visualization.
PREREQUISITES:	ME 345, AE 339, and AE 364
TEXT:	None, the following are reference texts • *Theory and Design for Mechanical Measurements" by R.S Figliola and D.E. Beasley, John Wiley and sons, 1991. This is the same text you used in ME 345.* • *Experimental Methods for Engineers" by J.P. Holman, 7th Ed. McGraw-Hill (International Edition).* • *Fundamentals of Aerodynamics" by J.D. Anderson, 4th Ed. McGraw-Hill. This is the same text you used in AE 439.* • *Theory of Wing Sections" by I.H. Abbott and A.E. von Doenhoff, 1st Ed. McGraw-Hill, 1949.* • *Shock Tubes" by J.K. Wright, John Wiley and sons, 1961.*
CLASS SCHEDULE:	Lecture: 8:30 a.m. - 9:20 a.m. - MW - JH 205 Lab: 12:30 p.m. - 3:20 a.m. – M, W, or F – JH 168
GRADES:	Class Participation 5% Six Laboratory Reports 50% Seven Quizzes 25% Final Exam 20%
COURSE OBJECTIVES:	After completing this course, a student should be able to: • Initiate the design of an experiment by using dimensional analysis and modeling. • Write technical reports about aerodynamic experiments and make oral presentations.
TOPICS COVERED:	• Flow Visualization • Lift and Drag of Wings • Pressure Distribution Around Wings • Supersonic Flow from Nozzles

Course Information	**AE 447 Aerofluids Laboratory** 3 credits Required Spring 2012
	• Boundary Layers • Shock Tubes
RELATIONSHIP TO PROGRAM EDUCATIONAL OBJECTIVES:	C ability to communicate clearly and effectively with fellow engineers, employers and general public D skills needed to fulfill professional duties and responsibilities in teamwork, collegiality, ethics, technical leadership, etc.
RELATIONSHIP TO PROGRAM OUTCOMES:	a ability to apply knowledge of mathematics, science, and engineering b ability to design and conduct experiments, as well as to analyze and interpret data e ability to identify, formulate, and solve engineering problems g ability to communicate effectively
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 1 1/2 years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	AE1 knowledge covering aeronautical or astronautical engineering areas AE2 knowledge of some topics from area not emphasized
POLICIES:	• Lab reports will be due one week after the completion of the Lab by 4:30pm. Late reports will be accepted up to 5 days with a grade reduction of 10 points per day. • Student is responsible for content of all reading assignments and lectures, i.e. quiz content will be taken from these reading assignments, lecture notes as well as the laboratory work.
AUTHOR/DATE:	B. Qawasmeh January 2012