

Course Schedule - Fall 2004

Aerospace Engineering

199 **Undergraduate Open Seminar** Credit: 1 to 5 hours.
(A A E 199)

CRN	Type	Section	Time	Days	Location	Instructor
10004	independent study		ARRANGED			
10004: Instructor Approval Required						
31177	lecture-discussion	AC	09:00 AM - 09:50 AM	R	room 241 Everitt Elec and Comp Engr Lab	Bragg, M
31177: 1 hoursTopic: Intro to Aircraft. 1 hour.						
31168	lecture-discussion	SD	09:00 AM - 09:50 AM	R	room 106B1 Engineering Hall	Coverstone, V; Geubelle, P
31168: 1 hoursTopic: Intro to Applied Space Design. 1 hour.						
31173	lecture-discussion	SF	09:00 AM - 09:50 AM	R	room 225A Talbot Laboratory	Prussing, J
31173: 1 hoursTopic: Intro to Space Flight. 1 hour.						

311 **Incompressible Flow** Credit: 3 hours.

(A A E 211) Equations of motion for incompressible flow, both inviscid and viscous; potential flow theory, inviscid airfoil theory: two- and three-dimensional, Navier-Stokes equations, laminar boundary layer and transition to turbulence. Prerequisite: CS 101 and MATH 380.

CRN	Type	Section	Time	Days	Location	Instructor
29785	lecture-discussion	A	01:00 PM - 01:50 PM	MTWTF	room 217 Noyes Laboratory	Austin, J

321 **Aerospace Structures I** Credit: 3 hours.

(A A E 220) Fundamental concepts in the linear theory of elasticity, including stress, strain, equilibrium, compatibility, material constitution and properties. Introduction to failure mechanisms and criteria. Application to plane stress/strain problems, beams in extension and bending, and shafts in torsion. Credit is not given for both AE 321 and TAM 251. Prerequisite: TAM 210 and MATH 385.

CRN	Type	Section	Time	Days	Location	Instructor
29786	lecture-discussion	A	09:00 AM - 09:50 AM	MWF	room 103 Talbot Laboratory	Bergman, L

352 Aerospace Dynamics Credit: 3 hours.

(A A E 250) Particle kinematics and dynamics; Lagrange's equations; vibration of multiple degree-of-freedom systems; rotational kinematics and dynamics of rigid bodies Credit is not given for both AE 352 and TAM 412. Prerequisite: AE 252, MATH 225 and 385.

CRN	Type	Section	Time	Days	Location	Instructor
29788	lecture-discussion	A	11:00 AM - 11:50 AM	MTWTF	room 103 Talbot Laboratory	Namachchivaya, N

395 Honors Project Credit: 1 to 4 hours.

(A A E 296) Special aerospace engineering project or reading course for James Scholars in engineering. Prerequisite: James Scholar in engineering; consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10012	independent study		ARRANGED			
10012: Instructor Approval Required						

396 Honors Seminar Credit: 1 to 4 hours.

(A A E 297) Special lecture sequences and/or discussion groups arranged each term to bring James Scholars in engineering into direct contact with the various aspects of engineering practices and philosophy. Prerequisite: James Scholar in engineering; consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10015	independent study		ARRANGED			
10015: Instructor Approval Required						

397 Independent Study Credit: 1 to 3 hours.

(A A E 291) Independent theoretical and experimental projects in aerospace engineering. May be repeated. Prerequisite: Consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10008	independent study		ARRANGED			
10008: Instructor Approval Required						

402 Orbital Mechanics Credit: 3 or 4 hours.

(A A E 306) Analysis of orbits in an inverse-square gravitational field; elementary rocket dynamics, impulsive orbit transfer and rendezvous, and Lambert's Theorem with applications; patched-conic trajectories, planetary gravity-assist maneuvers, and linearized orbit theory with application to simplified analytical models; perturbations. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: AE 302 or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
29794	lecture-discussion	A	11:00 AM - 11:50 AM	MWF	room 241 Everitt Elec and Comp Engr Lab	Conway, B

412 Viscous Flow and Heat Transfer Credit: 4 hours.

(A A E 314) Momentum and thermal transport in wall boundary-layer and free shear flows, solutions to the Navier-Stokes equations for heat conducting laminar and turbulent shear flows; similarity concepts; thermal boundary layers in ducts and high-speed aerodynamic boundary layers. Same as ME 411, and TAM 438. 4 undergraduate hours. 4 graduate hours. Prerequisite: AE 311 or ME 310 or equivalent.

CRN	Type	Section	Time	Days	Location	Instructor
29800	lecture-discussion	A	10:00 AM - 11:50 AM	TR	room 218 Mechanical Engineering Bldg	Buckmaster, J

416 Applied Aerodynamics Credit: 3 or 4 hours.

(A A E 316) Two-dimensional and finite wing theory with emphasis on the mechanisms of lift and drag generation; Reynolds number and Mach number effects; drag analysis; high-lift wing systems; propeller and rotor aerodynamics; control surface design; and application of V/STOL aerodynamics. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: AE 311 or equivalent; or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
29803	lecture-discussion	A	12:00 PM - 12:50 PM	MWF	room 103 Talbot Laboratory	Selig, M

420 Intro to Finite Element Anlys Credit: 3 or 4 hours.

(A A E 321) Same as CSE 451, and ME 471. See ME 471.

CRN	Type	Section	Time	Days	Location	Instructor
36855	lecture	C	10:00 AM - 10:50 AM	MWF	room 243 Mechanical Engineering Bldg	Thomas, B

428 Mechanics of Composites Credit: 3 hours.

(A A E 328) Same as TAM 428. See TAM 428.

CRN	Type	Section	Time	Days	Location	Instructor
35294	lecture-discussion	F	02:00 PM - 02:50 PM	MWF	room 1109 Siebel Center for Comp Sci	Sottos, N

433 Aerospace Propulsion Credit: 3 hours.

(A A E 233) Fundamentals of rocket and airbreathing jet propulsion devices; prediction of thrust, combustion reactions, specific fuel consumption, and operating performance; ramjets; turbojets; turboprops; aerothermodynamics of inlets, combustors, and nozzles; compressors, turbines; and component matching. 3 undergraduate hours. Prerequisite: AE 312, and CS 101.

CRN	Type	Section	Time	Days	Location	Instructor
29787	lecture-discussion	A	02:00 PM - 02:50 PM	MWF	room 103 Talbot Laboratory	Burton, R

440 Aerospace Systems Design I Credit: 3 hours.

(A A E 240) Introduction to the design of aerospace flight systems. The principles of systems engineering, as they apply to the design process, are presented. A general design methodology is introduced. These concepts are then applied to the initial sizing of both aircraft and spacecraft systems. Involves intensive technical writing. 3 undergraduate hours. No graduate credit. Prerequisite: Credit or concurrent registration in AE 302, 311, 322, 352, and 433.

This course satisfies the General Education Criteria for a Advanced Composition course.

CRN	Type	Section	Time	Days	Location	Instructor
31206	lecture-discussion	A1	03:00 PM - 04:20 PM	T	room 103 Talbot Laboratory	Selig, M
31206: Advanced Composition course.						
	lecture-discussion	A1	03:00 PM - 04:20 PM	R	room 241 Everitt Elec and Comp Engr Lab	Selig, M
: Advanced Composition course.						
: Topic: Aircraft Design.						
31216	lecture-discussion	S1	03:00 PM - 04:20 PM	TR	room 106B6 Engineering Hall	Burton, R
31216: Advanced Composition course.						
31216: Topic: Spacecraft Design.						

460 Aerodynamics & Propulsion Lab Credit: 2 hours.

(A A E 260) Examines theory and application of experimental techniques in aerospace engineering with emphasis on fluid dynamics, aerodynamics, thermal, combustion and propulsion phenomena. 2 undergraduate hours. No graduate credit. Prerequisite: AE 311; credit or concurrent registration in AE 433.

Students must register for one lab and one lecture-discussion section.

CRN	Type	Section	Time	Days	Location	Instructor
36451	laboratory	AB1	01:00 PM - 03:00 PM	M		Elliott, G
36451: DO NOT GO TO THE LABS THE FIRST WEEK. GO TO CLASS FIRST ON THURSDAY AT 9AM, THEN LAB ASSIGNMENTS WILL BE MADE.						
36452	laboratory	AB2	04:00 PM - 06:00 PM	F		Elliott, G
36452: DO NOT GO TO THE LABS THE FIRST WEEK. GO TO CLASS FIRST ON THURSDAY AT 9AM, THEN LAB ASSIGNMENTS WILL BE MADE.						
36453	laboratory	AB3	11:30 AM - 01:30 PM	R		Elliott, G
36453: DO NOT GO TO THE LABS THE FIRST WEEK. GO TO CLASS FIRST ON THURSDAY AT 9AM, THEN LAB ASSIGNMENTS WILL BE MADE.						
36454	laboratory	AB4	01:00 PM - 02:50 PM	T		Elliott, G
36454: DO NOT GO TO THE LABS THE FIRST WEEK. GO TO CLASS FIRST ON THURSDAY AT 9AM, THEN LAB ASSIGNMENTS WILL BE MADE.						
36455	laboratory	AB5	11:00 AM - 12:59 PM	T		Elliott, G
36455: DO NOT GO TO THE LABS THE FIRST WEEK. GO TO CLASS FIRST ON THURSDAY AT 9AM, THEN LAB ASSIGNMENTS WILL BE MADE.						
36456	laboratory	AB6	02:00 PM - 04:00 PM	R		Elliott, G
36456: DO NOT GO TO THE LABS THE FIRST WEEK. GO TO CLASS FIRST ON THURSDAY AT 9AM, THEN LAB ASSIGNMENTS WILL BE MADE.						
36457	laboratory	AB7	04:00 PM - 06:00 PM	M		Elliott, G
36457: DO NOT GO TO THE LABS THE FIRST WEEK. GO TO CLASS FIRST ON THURSDAY AT 9AM, THEN LAB ASSIGNMENTS WILL BE MADE.						
36458	laboratory	AB8	09:00 AM - 11:00 AM	M		Elliott, G
36458: DO NOT GO TO THE LABS THE FIRST WEEK. GO TO CLASS FIRST ON THURSDAY AT 9AM, THEN LAB ASSIGNMENTS WILL BE MADE.						
36450	lecture-discussion	AE1	09:00 AM - 09:50 AM	TR	room 103 Talbot Laboratory	Elliott, G
36450: Do not go to the labs the first week. Go to class first on Thursday at 9am, then lab assignments will be made.						

470 Aerospace Numerical Methods Credit: 3 hours.

(A A E 270) Introduction to numerical methods used in aerospace engineering. Finite difference method; Variational principles and Rayleigh-Ritz method; finite element method; applications from simple structural mechanics and aerodynamics problems encountered in aerospace engineering. 3 undergraduate hours. No graduate credit. Prerequisite: CS 101, AE 311, 312, 321, and 322; or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
29791	lecture-discussion	A	09:00 AM - 09:50 AM	MWF	room 106B8 Engineering Hall	Geubelle, P

497 Independent Study Credit: 1 to 4 hours.

(A A E 391) Independent theoretical and experimental projects in aerospace engineering. Prerequisite: Senior standing in engineering; consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10019	independent study		ARRANGED			
10019: Instructor Approval Required						

498 Special Topics Credit: 1 to 4 hours.

(A A E 398) May be repeated in the same or separate semesters as topics vary to a maximum of 9 undergraduate hours or 12 graduate hours. Prerequisite: Senior standing in engineering; as specified for each topic offering, see Schedule or departmental course information.

CRN	Type	Section	Time	Days	Location	Instructor
39787	laboratory	A	ARRANGED			Coverstone, V
	lecture-discussion	A	04:00 PM - 05:50 PM	T	room 245 Everitt Elec and Comp Engr Lab	Coverstone, V
: Topic: Interdisciplinary Design. 2 or 3 hours.						
39788	lecture-discussion	D	10:00 AM - 11:20 AM	TR	room 241 Everitt Elec and Comp Engr Lab	Voulgaris, P; Namachchivaya, N
39788: Topic: Intro to SYS Dynamics And Controls. 3 or 4 hours.						
39790	lecture-discussion	RAS	01:30 PM - 02:50 PM	TR	room 203 Transportation Bldg	Frazzoli, E
39790: 3 hours Topic: Intro to Real-Time Avionics Systems. 3 hours.						
41230	lecture-	RPM	10:00 AM - 11:50	M	room 225A	White, S

	discussion		AM		Talbot Laboratory	
	lecture-discussion	RPM	10:00 AM - 10:50 AM	F	room 225A Talbot Laboratory	White, S
: 3 hoursRapid Prototyping and Manufacturing, 3 hours						
39791	lecture-discussion	SSS	03:00 PM - 04:20 PM	TR	room 104 Talbot Laboratory	Neogi, N
39791: 3 hoursTopic: Software And Systems Safety. This Section is for 3 Hours Only.						

504 **Optimal Aerospace Systems** Credit: 4 hours.

(A A E 404) Formulation of parameter and functional optimization problems for dynamic systems; applications of optimization principles to the control and performance of aerospace vehicles, including optimal flight paths, trajectories, and feedback control. Prerequisite: AE 352 or equivalent.

CRN	Type	Section	Time	Days	Location	Instructor
29806	lecture-discussion	A	09:00 AM - 09:50 AM	MWF	room 225A Talbot Laboratory	Prussing, J

511 **Transonic Aerodynamics** Credit: 4 hours.

(A A E 411) Fundamentals of transonic flows; transonic characteristics and flow modeling, shock wave development, properties of shock wave, transonic similarity, shock- boundary layer interactions, three-dimensional effects, transonic solution techniques, transonic design, transonic testing. Prerequisite: ME 410 or equivalent; or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
39792	lecture-discussion	A	01:30 PM - 02:50 PM	MW	room 225A Talbot Laboratory	Lee, K

528 **Nonlinear Continuous Media** Credit: 4 hours.

(A A E 428) Fundamental concepts of large deformations in nonlinear elasticity and inelasticity with applications: generalized tensors, finite deformations, stress-strain relations in terms of strain energy functions, solutions of tension, shear and bending problems, finite plane strain, theory of successive approximations, fiber-reinforced beams, plates and cylinders, thermodynamics of deformable media, stability considerations, and constituent relations for inelasticity. Prerequisite: Consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
39793	lecture-discussion	A	08:30 AM - 09:50 AM	TR	room 104 Talbot Laboratory	Hilton, H

555 **Multivariable Control Design** Credit: 4 hours.

(A A E 455) Frequency response design-specifications; algebraic and analytic constraints in scalar systems; uncertainty representation; Nyquist stability theory, small gain condition, multi-input multi-output systems; singular

value decomposition; robustness and u-function; linear quadratic regulator based design; recovery of LQ Design properties; Kalman filter; Riccati equations; H-infinity based design; reduction; balanced truncation; Hankel singular values; coprime factor reduction; loop shaping. Same as GE 521. Prerequisite: ECE 515.

CRN	Type	Section	Time	Days	Location	Instructor
36459	lecture-discussion	A	09:00 AM - 10:20 AM	MW	room 252 Mechanical Engineering Bldg	Medanic, J

590 Seminar Credit: 0 hours.

(A A E 490) Presentation by graduate students, staff, and guest lecturers of current topics in aerospace engineering. Approved S/U grading only. Prerequisite: Graduate standing in aerospace engineering.

CRN	Type	Section	Time	Days	Location	Instructor
29808	conference	A	04:00 PM - 04:50 PM	MWF	room 103 Talbot Laboratory	Austin, J

597 Independent Study Credit: 1 to 4 hours.

(A A E 493) Independent theoretical and experimental projects in aerospace engineering. Prerequisite: Graduate standing in engineering; consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10021	independent study		ARRANGED			
10021: Instructor Approval Required						

598 Special Topics Credit: 1 to 4 hours.

(A A E 498) Special topics in Aerospace Engineering. May be repeated in the same or separate terms as topics vary to a maximum of 12 hours. Prerequisite: Graduate standing in engineering; as specified for each topic offering, see Schedule or departmental course information.

CRN	Type	Section	Time	Days	Location	Instructor
40012	laboratory	A	ARRANGED			
	lecture-discussion	A	04:00 PM - 05:50 PM	T	room 245 Everitt Elec and Comp Engr Lab	Coverstone, V
: Instructor Approval Required Topic: Interdisciplinary Design. Meets with AE 498/ECE 498 ID/ID1. Instructor's consent required to register. 2 hours.						
39796	lecture-discussion	DP	12:00 PM - 01:50 PM	TR	room 225A Talbot Laboratory	Lambros, J

39796: 4 hoursTopic: Dynamic Properties Of Materials. 4 hours.						
39795	lecture-discussion	RAS	ARRANGED			Frazzoli, E
39795: 4 hoursTopic: Introduction to Real-Time Avionics Systems. 4 hours.						

599 Thesis Research Credit: 0 to 16 hours.

(A A E 499) Research in the various areas of aerospace engineering. May be repeated. Approved for S/U grading only.

CRN	Type	Section	Time	Days	Location	Instructor
10024	independent study		ARRANGED			
10024: Instructor Approval Required						