Course 1

Course Codes	Code	Number	Subletter	Home Dept?
	MAE	305		Y
	MAT	301		N

Max. Enrollment	120
May PDF?	N
May Audit?	N
Assignments	

Title	Mathematics in Engineering I
Topic	
Subletter	
Description	A treatment of the theory of differential equations. The objective is to provide the student with an ability to solve standard problems in this field.

Website	
Final Exam Type	Final
Grading	Perc.	Type

Sample Reading List	Author Name	Title
	Boyce & DiPrima	Elementary Differential Equations & Boundary Value Problems

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
L	01	O	120	20079	11:00:00	11:50:00	BOWEN 222	M W F	N	Morton	Daniel	Kostin
										Zheng		Chen
										Raghavendra	Pradeep	Kukillaya
										Zhanhua		Ma

Course 2

Course Codes	Code	Number	Subletter	Home Dept?
	MAE	221		Y

Max. Enrollment	60
May PDF?	N
May Audit?	N

Title	Thermodynamics
Topic	
Subletter	
Description	Heat and work in physical systems. Concepts of energy conversion and entropy, primarily from a macroscopic viewpoint. Thermodynamic potentials and chemical equilibrium. Applications to engines, heat pumps, and fuel cells. In the laboratory, students will carry out experiments in the fields of analog electronics and thermodynamics. FOR MAE CONCENTRATORS ONLY, a combined laboratory grade will be issued in the spring laboratory course MAE 224, which includes the laboratory work of both MAE 221 and MAE 224.

Assignments	Weekly reading assignments and problem sets, about 9 hours per week.
Website	
Final Exam Type	Final

Grading	Perc.	Type
	20	MidTerm Exam
	40	Final Exam
	40	Problem Set(s)

Sample Reading List	Author Name	Title
	Moran & Shapiro	Fundamentals of Engineering Thermodynamics, 5th Ed.

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
B	01	O	12	20059	13:30:00	16:20:00	EQUAJ J209	M	N	Michael		Vocaturo
										Syed	Sohail Hamid	Zaidi
										Grunde		Jomaas
B	02	X	12	20060	13:30:00	16:20:00	EQUAJ J209	T	N	Michael		Vocaturo
										Syed	Sohail Hamid	Zaidi
										Grunde		Jomaas
B	03	O	12	20061	13:30:00	16:20:00	EQUAJ J209	W	N	Michael		Vocaturo
										Syed	Sohail Hamid	Zaidi
										Emanuel	Solomon	Stockman
B	04	O	12	20062	13:30:00	16:20:00	EQUAJ J209	Th	N	Michael		Vocaturo
										Syed	Sohail Hamid	Zaidi
										Chun-Wei		Pao
L	01	O	60	20063	10:00:00	10:50:00	FRIEN 004	M W F	N	Daniel	Mark	Nosenchuck
C	01	O	50	20064	12:30:00	13:20:00	EQUAD D221	M	N	Daniel	Mark	Nosenchuck
										Syed	Sohail Hamid	Zaidi

- Course Codes

Code	Number	Subletter	Home Dept?
MAE	223		Y
CEE	323		N

Max. Enrollment	60
May PDF?	Y
May Audit?	Y
Assignments	Weekly homework assignments, accounts for 30% of the final grade. Weekly quizzes, accounts for 5% of the final grade.

Title	Modern Solid Mechanics
Topic	
Subletter	

Website	
Final Exam Type	Final

Description	Fundamental principles of solid mechanics: equilibrium equations, reactions, internal forces, stress, strain, Hooke's law, torsion, beam bending and deflection, and analysis of stress and deformation in simple structures. Integrates aspects of solid mechanics that have applications to mechanical and aerospace structures (engines and wings), as well as to microelectronic and biomedical devices (thin films and artificial hearts). Topics include stress concentration, fracture, plasticity, fatigue, visco-elasticity and thermal expansion. The course synthesizes descriptive observations, mathematical theories, and engineering consequences.

Grading

Perc.	Type
25	MidTerm Exam
40	Final Exam
5	Quizzes
30	Problem Set(s)

Sample Reading List

Author Name	Title
E.J. Hearn	Mechanics of Materials, Volumes 1 & 2 (Pergamon)
J.P. Den Hartog	Mechanics (Dover)

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
L	01	O	60	20080	11:00:00	12:20:00	EQUAD D221	T Th	N	Mikko Yong	Petteri	Haataja Yang

- Course Codes

Code	Number	Subletter	Home Dept?
MAE	331		Y

Max. Enrollment	60
May PDF?	N
May Audit?	N

Title	Aircraft Flight Dynamics
Topic	
Subletter	

Assignments	Mix of problem sets and short projects.
Website	
Final Exam Type	Final

Description	Introduction to the performance, stability, and control of aircraft. Fundamentals of configuration aerodynamics. Methods for analyzing the dynamics of physical systems. Characterization of modes of motion and desirable flying qualities. Case studies in aircraft stability and control.

Grading

Perc.	Type
20	MidTerm Exam
35	Final Exam
10	Precept Participation
35	Problem Set(s)

Sample Reading List

Author Name	Title
R. Stengel	Flight Dynamics, Princeton University Press, 2004
M.J. Abzug and E.E. Larrabee	Airplane Stability and Control

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
L	01	O	60	20081	15:00:00	16:20:00	EQUAD D221	T Th	N	Ellen Robert Milos Sunil	Meredith Frank Doulatram	Taylor Stengel Ilak Ahuja
P	01	X	60	22359								

Course Codes	Code	Number	Subletter	Home Dept?		Max. Enrollment	59			
	MAE	321		Y		May PDF?	N			
						May Audit?	N			

Title: Engineering Design

Topic:

Subletter:

Assignments: Reading from references and notes. One major project. Lab reports and problem sets. Mid-term exam. The project will involve design concepts, component and system design, construction and device fabrication.

Website:

Final Exam Type: Take-Home

Description: Focus on engineering fundamentals, design processes and procedures. Course covers materials selection and design, machine design and innovation, and design and manufacture for a global environment. Parametric-design and finite-element simulation techniques are introduced in the computer-design laboratory. Instruction in basic and computer-based fabrication and prototyping methods is given in the manufacturing laboratory. Teams of students conduct design projects which involve the complete design cycle from concept and fundamental engineering through optimization, prototype, and test. Description continued in Other Information.

Grading:

Perc.	Type
25	MidTerm Exam
25	Design Project(s)
25	Take Home Final Exam
10	Lab Reports
15	Problem Set(s)

Sample Reading List:

Author Name	Title
Shigley and Mische	Mechanical Engineering Design
M.F. Ashby	Materials Selection in Mechanical Design

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
B	01	X	15	20065	13:30:00	16:20:00	EQUAC C119	M	N	Glenn	Arther	Northey
										Guoguang		Fu
B	02	O	15	20066	13:30:00	16:20:00	EQUAC C119	T	N	Glenn	Arther	Northey
										Jianbo		Chen
B	03	O	15	20067	13:30:00	16:20:00	EQUAC C119	W	N	Glenn	Arther	Northey
										Jun		Song
B	04	O	15	20068	13:30:00	16:20:00	EQUAC C119	Th	N	Glenn	Arther	Northey
B	05	O	15	20069	13:30:00	16:20:00	EQUAC C119	F	N	Glenn	Arther	Northey
L	01	O	59	20070	11:00:00	12:20:00	FRIEN 004	T Th	N	Winston	Oluwole	Soboyejo

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Course Codes	Code	Number	Subletter	Home Dept?		Max. Enrollment	55			
	MAE	324		Y		May PDF?	Y			
						May Audit?	Y			

Title: Structure and Properties of Materials

Topic:

Subletter:

Assignments: Weekly problem sets, question cards, and reading in reference texts.

Website:

Final Exam Type: Final

Description: Provides the materials background needed to satisfy the department requirement in this area. Relates properties of metals, alloys, polymers, composite materials, semiconductors, and ceramics to their atomic level and microscopic structure. Relates special materials properties to their exploitation in advanced technology and will illustrate this with specific examples.

Grading:

Perc.	Type
20	MidTerm Exam
40	Final Exam
20	Other Exam
5	Precept Participation
15	Problem Set(s)

Sample Reading List:

Author Name	Title
Callister	Materials Science & Engineering

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
L	01	O	55	20082	13:30:00	14:50:00	EQUAD D221	T Th	N	Emily	Ann	Carter
P	01	X	55	20083	12:30:00	13:20:00	EQUAD D221	Th	N	Srevatsan		Muralidharan

Course 1

Course Codes	Code	Number	Subletter	Home Dept?
	MAE	335		Y

Max. Enrollment	50	
May PDF?	Y	
May Audit?	Y	

Title	Fluid Dynamics
Topic	
Subletter	

Assignments	Reading 30-40 pages of text. Weekly problem sets.
Website	
Final Exam Type	Final

Description: The first half of the course deals with one-dimensional compressible flows, with special emphasis on jet propulsion applications. The second half of the course deals with aerodynamics of two and three-dimensional wings and bodies, concepts of thrust, lift and drag (frictional and lift-induced). Homework will include design problems and computational examples.

Grading

Perc.	Type
30	MidTerm Exam
40	Final Exam
30	Problem Set(s)

Sample Reading List

Author Name	Title
Anderson	Fundamentals of Aerodynamics
Kuethe & Chow	Foundations of Aerodynamics
Smits	A Physical Introduction to Fluid Mechanics
Liepmann and Roshko	Elements of Gas Dynamics

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
L	01	O	50	20071	10:00:00	10:50:00	EQUAD D221	M W F	N	Maria	Pino	Martin
P	01	X	50	20084	19:30:00	20:50:00	EQUAD D221	T	N	Bo Zhili	Xu	Zhang

Course 2

Course Codes	Code	Number	Subletter	Home Dept?
	MAE	501		Y

Max. Enrollment	50	
May PDF?	N	
May Audit?	Y	

Title	Mathematical Methods of Engineering Analysis I
Topic	
Subletter	

Assignments	
Website	
Final Exam Type	Other

Description: Methods of mathematical analysis for the solution of problems in physics and engineering. Topics include an introduction to functional analysis, linear analysis & eigenvalue problems for matrices & operators, Sturm-Liouville theory, Green's functions for the solution of linear ordinary differential equations and Poisson's equation, and the calculus of variations, and the inverse and implicit function theorems.

Grading

Perc.	Type

Sample Reading List

Author Name	Title
L. Debnath & PR Mikusinski	Introduction to Hilbert Spaces with Applications
RA Horn & CR Johnson	Matrix Analysis
M. Greenberg	Foundations of Applied Mathematics
IS Sokolniroff & RM Redheffer	Mathematics of Physics & Modern Engineering

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
L	01	O	50	20311	09:00:00	10:20:00	EQUAA A224	T Th	N	Naomi	Ehrich	Leonard

Course 3

Course Codes	Code	Number	Subletter	Home Dept?
	MSE	501		Y
	MAE	561		N

Max. Enrollment	50	
May PDF?	Y	
May Audit?	Y	
Assignments		

Title	Introduction to Materials
Topic	
Subletter	

Website	
Final Exam Type	Other
Grading	Perc. Type

Description: Emphasizes the connection between microstructural features of materials and their properties, and how processing conditions control structure. Topics include atomic bonding, crystal structure, thermodynamics, phase diagrams, defects, microstructure, diffusion, phase transformations, nucleation, coarsening, glasses, elastic and plastic deformation, fracture, processing, composites, and electronic properties.

Sample Reading List

Author Name	Title
J.F. Nye	Physical Properties of Crystals
P. Haasen	Physical Metallurgy
C. Hall	Polymers Materials
Y.T. Ciang, D. Birnie, and W.D. Kingery	Physical Ceramics
D.A. Porter and K.E. Easterling	Phase Transformations in Metals and Alloys
C. Kittel	Introduction to Solid State Physics

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
L	01	O	50	21439	14:30:00	15:50:00	BOWEN 222	M W	N	George	W.	Scherer

Course Codes	Code	Number	Subletter	Home Dept?		Max. Enrollment	40		
	MAE	339		Y		May PDF?	N		
						May Audit?	N		
Title	Independent Work					Assignments			
Topic						Website			
Subletter						Final Exam Type	Other		
Description	Student selects subject and advisor - defines problem to be studied and proposes work plan. A list of possible subjects of particular interest to faculty and staff members is provided. Written report and oral presentation at end of semester to faculty, staff, fellow students and guests. Independent work is intended for juniors or seniors doing only a one term project. 339 Fall Term project; 340 Spring Term project.					Grading			
							Perc.	Type	
							75	Paper In Lieu of Final	
							20	Oral Presentation(s)	
							5	Precept Participation	
						Sample Reading List	Author Name		Title

Sections	Format	Number	Status	Max Enrollment	SCORE Number	Meetings						Instructors			
							Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
	C	01	O	20	20072		12:30:00	13:20:00	FRIEN 110	W	N	N.	Jeremy	Kasdin
	C	02	O	20	20073		19:30:00	20:20:00	FRIEN 110	W	N	N.	Jeremy	Kasdin

Course Codes	Code	Number	Subletter	Home Dept?		Max. Enrollment	40		
	MAE	339	D	Y		May PDF?	N		
						May Audit?	N		
Title	Independent Work with Design					Assignments			
Topic						Website			
Subletter	D					Final Exam Type	Other		
Description	Course similar to MAE 339-340. Principal difference is that the project must incorporate aspects and principals of design for a system, product, vehicle, device, apparatus, or other design element. Written report and oral presentation at end of semester to faculty, staff, fellow students and guests. Independent work with design is intended for juniors or seniors doing only a one term project. 339D Fall Term project; 340D Spring Term project.					Grading			
							Perc.	Type	
							75	Paper In Lieu of Final	
							20	Oral Presentation(s)	
							5	Precept Participation	
						Sample Reading List	Author Name		Title

Sections	Format	Number	Status	Max Enrollment	SCORE Number	Meetings						Instructors			
							Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
	C	01	O	20	20074		12:30:00	13:20:00	FRIEN 110	W	N	N.	Jeremy	Kasdin
	C	02	O	20	20075		19:30:00	20:20:00	FRIEN 110	W	N	N.	Jeremy	Kasdin

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Course Codes	Code	Number	Subletter	Home Dept?		Max. Enrollment	40	
						May PDF?	N	
	MAE	427		Y		May Audit?	N	
Title	Fossil Fuel Energy Conversion: Mobile Power Plants					Assignments	Homework problems, readings, and a sharply focused paper, (10 pages). Check within two weeks of Course Initiation for Recommended Textbook Purchases. Library reserve of all references will be available.	
Topic								
Subletter						Website		
Description	This course will develop an overview of technology and emission control of modern internal combustion power plants. Fundamental concepts of phenomena associated with mobile power plant design and applications, including both air-breathing and non-airbreathing propulsion will be discussed. Material on spark ignition and diesel power plants, as well as air-breathing propulsion devices, primarily gas turbines, and chemical rockets, will be covered. In addition, combustion emission and emission control will be discussed. Throughout the course, (See other information)					Final Exam Type	Final	
						Grading	Perc.	Type
							30	MidTerm Exam
							35	Final Exam
							5	Precept Participation
							30	Problem Set(s)
						Sample Reading List	Author Name	Title
							Ferguson and Kirkpatrick	Internal Combustion Engines:Applied Thermal Sciences, 2nd Ed
							Hill and Peterson	Mechanics and Thermodynamics of Propulsion
							Wark, Warner, and Davis	Air Pollution, Its Origin and Control
							Sutton	Rocket Propulsion Elements
							Lecture notes are generally distributed throughout	the course

Sections	Format	Number	Status	Max. Enrollment	SCORE Number	Meetings						Instructors		
							Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
	L	01	O	40	20076		11:00:00	11:50:00	EQUAD D221	M W F	N	Frederick	Lewis	Dryer
	C	01	O	40	20077		10:00:00	10:50:00	EQUAD D221	Th	N	Frederick Timothy	Lewis Michael	Dryer Ombrello

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Course Codes	Code	Number	Subletter	Home Dept?	Max. Enrollment	36	
					May PDF?	Y	
	ELE	521		Y	May Audit?	Y	
	MAE	547		N	Assignments		
Title	Linear System Theory				Website		
Topic					Final Exam Type	Final	
Subletter					Grading	Perc.	Type
Description	This course covers the fundamentals of linear system theory. Various topics important for further study in dynamic systems, control and communication and signal processing are presented.				Sample Reading List	Author Name	Title
						Brockett	Finite Dimensional Linear Systems
						Delchamps	State Space and Input Output Linear Systems
						Kailath	Linear Systems
						Wonham	Linear Multivariable Control: A Geometric Approach
						Rugh	Linear Systems Theory

Sections	Format	Number	Status	Max. Enrollment	SCORE Number	Meetings						Instructors		
							Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
	L	01	O	36	20487		15:00:00	16:20:00	FRIEN 108	M W	N	Peter Jiaping	Jeffrey	Ramadge Liu

Course 1

Course Codes	Code	Number	Subletter	Home Dept?
	MAE	435		Y

Title	Special Topics in Mechanical and Aerospace Engineering
Topic	Entrepreneurial Engineering
Subletter	
Description	This course builds on the technical foundations established in the engineering program, and extends the scope to include the business, financial, and marketing components that lead to successful entrepreneurial ventures. Students will be directly engaged in the process of identifying, creating and exploiting entrepreneurial opportunities. Entrepreneurial design will be introduced and developed. Students, working in small multidisciplinary teams, will identify, design and prototype a highly marketable, consumer product. Classic and modern market analysis, manufacture and distribution will be introduced along with business planning & finance.

Max. Enrollment	30
May PDF?	Y
May Audit?	Y
Assignments	Reading/Writing Assignments: Reading will be from distributed materials and printed and web-based references. Midterm and final reports (business plans and design reports). Presentations.
Website	
Final Exam Type	Other

Grading	Perc.	Type
	50	Design Project(s)
	25	Oral Presentation(s)
	25	Precept Participation

Sample Reading List	Author Name	Title
	H.H. Stevenson, M.J. Roberts & H. Grousbeck (5th Ed.)	New Business Ventures & the Entrepreneur, 1999 McGraw Hill
	The Indus Entrepreneurs (TiE) (Wiley 2003) - Essentials	of Entrepreneurship: What it Takes to Create Successful...
	T.R. Hawthorne, NTC Business Books, 1997	The Complete Guide to Infomercial Marketing
	L.C. Farrell (Wiley 2003) - Getting Entrepreneurial:	Creating & Growing Your Own Business in the 21st Century

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
L	01	O	30	20078	15:00:00	16:20:00	EQUAD D221	M W	N	Daniel	Mark	Nosenchuck

Course 2

Course Codes	Code	Number	Subletter	Home Dept?
	MAE	437		Y
	EGR	437		N

Title	Introduction to Innovation Process Management
Topic	
Subletter	
Description	In today's hypercompetitive global marketplace, innovation is the lifeblood of any business enterprise. This course exposes students to all fundamental aspects of the technological innovation process: invention/concept development, intellectual property, business plan preparation, competitive intelligence, R&D management, and critical success factors, project management, commercialization. It covers the basic management practices required to excel in the craft of successful innovation and prepares students to become technology-savvy leaders of industry or government, as well as managers and executives in a complex technological society.

Max. Enrollment	30
May PDF?	Y
May Audit?	Y
Assignments	Specific reading assignments will be given out at the beginning of each lecture. Attendance counts for 20% of the final grade.
Website	
Final Exam Type	Take-Home

Grading	Perc.	Type
	40	Take Home Final Exam
	20	Oral Presentation(s)
	20	Precept Participation
	20	Other (See Instructor)

Sample Reading List	Author Name	Title
	W.L. Miller and L. Morris	Fourth Generation R&D
	M.L. Patterson	Accelerating Innovation
	E.I. Schwartz	Juice: The Creative Fuel that Drives World-Class Inventors
	P. Drucker	Management Challenges for the 21st Century
	J.A. Heim and W.D. Compton	Manufacturing Systems: Foundations of World-Class Practice
	R.G. Cooper, Winning at New Products:	Accelerating the Process from Idea to Launch, 3rd Ed.

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
L	01	O	30	22100	11:00:00	12:20:00	FRIEN 108	T Th	N	Karl	H.	Zaininger

Course 1

Course Codes	Code	Number	Subletter	Home Dept?
	MAE	541		Y
	APC	571		N

Max. Enrollment	30
May PDF?	Y
May Audit?	Y
Assignments	

Title	Applied Dynamical Systems
Topic	
Subletter	

Website	
Final Exam Type	Other
Grading	Perc. Type

Description: Phase-plane methods and single-degree-of-freedom nonlinear oscillators; invariant manifolds, local and global analysis, structural stability and bifurcation, center manifolds, and normal forms; averaging and perturbation methods, forced oscillations, homoclinic orbits, and chaos; and Melnikov's method, the Smale horseshoe, symbolic dynamics, and strange attractors.

Sample Reading List	Author Name	Title
	J. Guckenheimer & P. Holmes	Nonlinear Oscillations, Dynamical Systems & Bifurcations of
	A.A. Andronov, E.A. Vitt, S.E. Khaiken	Theory of Oscillators
	M.W. Hirsch, S. SImale adn R.L. Devaney	Dirrential Equations, Dynamical Systems & An Intro to Chaos

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days/Day	TBA?	First	Middle	Last
L	01	O	30	20316	13:30:00	14:50:00	FINEH 110	T Th	N	Clarence	Worth	Rowley

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Course 2

Course Codes	Code	Number	Subletter	Home Dept?
	MAE	542		Y

Max. Enrollment	30
May PDF?	N
May Audit?	Y
Assignments	

Title	Advanced Dynamics
Topic	
Subletter	

Website	
Final Exam Type	Other
Grading	Perc. Type

Description: Principles and methods for formulating and analyzing mathematical models of physical systems; Newtonian, Lagrangian, and Hamiltonian formulations of particle and rigid and elastic body dynamics; canonical transformations, Hamilton-Jacobi theory; and integrable and nonintegrable systems. Additional topics are explored at the discretion of the instructor.

Sample Reading List	Author Name	Title
	H. Goldstein	Classical Mechanics
	V.I. Arnold	Mathematical Methods of Classical Mechanics
	C. Lanczos	The Variational Principles of Mechanics

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days/Day	TBA?	First	Middle	Last
S	01	O	30	20317	11:00:00	12:20:00	EQUAA A224	T Th	N	N.	Jeremy	Kasdin

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Course 3

Course Codes	Code	Number	Subletter	Home Dept?
	AST	551		Y
	MAE	525		N

Max. Enrollment	30
May PDF?	Y
May Audit?	Y
Assignments	

Title	General Plasma Physics I
Topic	
Subletter	

Website	
Final Exam Type	Other
Grading	Perc. Type

Description: An introductory course to plasma physics, with sample applications in fusion, space and astrophysics, semiconductor etching, microwave generation, plasma propulsion, high power laser propagation in plasma; characterization of the plasma state, Debye shielding, plasma and cyclotron frequencies, collision rates and mean-free paths, atomic processes, adiabatic invariance, orbit theory, magnetic confinement of single-charged particles, two-fluid description, magnetohydrodynamic waves and instabilities, heat flow, diffusion, kinetic description, and Landau damping. The course may be taken by undergraduates with permission of the instructor.

Sample Reading List	Author Name	Title
	Goldston and Rutherford	Introduction to Plasma Physics
	Stix and von Goeler	GPPI lecture notes
	Hazeltine and Waelbroeck	The Framework of Plasma Physics

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days/Day	TBA?	First	Middle	Last
C	01	O	30	21697	10:00:00	10:50:00	JADWH A07	M W F	N	Nathaniel Hong	J.	Fisch Qin

Course 1

Course Codes	Code	Number	Subletter	Home Dept?
	GEO	425		Y
	MAE	425		N

Max. Enrollment	30
May PDF?	N
May Audit?	N
Assignments	Three to four problems every two weeks.

Title: Introduction to Physical Oceanography
Topic:
Subletter:

Website:
Final Exam Type: Final

Description: The study of the oceans as a major influence on the atmosphere and the world environment. The contrasts between the properties of the upper and deep oceans; the effects of stratification; the effect of rotation; the wind-driven gyres; the thermohaline circulation.

Grading

Perc.	Type
20	MidTerm Exam
40	Final Exam
40	Problem Set(s)

Sample Reading List

Author Name	Title
Pond & Pickard	Introductory Dynamical Oceanography, 2nd ed.
Pickard & Emery	Descriptive Physical Oceanography: An Introduction
Open University Course Team	Ocean Circulation (2001)
Open University Course Team	Waves, tides, and Shallow-Water Processes

Sections

Format	Number	Status	Max Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
L	01	O	30	20027	10:00:00	10:50:00	GUYOT 154	M W F	N	Anand		Gnanadesikan

Course 2

Course Codes	Code	Number	Subletter	Home Dept?
	MAE	521		Y

Max. Enrollment	20
May PDF?	N
May Audit?	Y

Title: Optics and Lasers
Topic:
Subletter:

Assignments:
Website:
Final Exam Type: Other

Description: An introduction to principles of lasers. Topics include propagation theory, interaction of light and matter, Fourier optics, and a description of operational characteristics of lasers, light scattering, and nonlinear optics.

Grading

Perc.	Type

Sample Reading List

Author Name	Title
Eckbreth, Alan C	Laser Diagnostics for Combustion Temperature & Species

Sections

Format	Number	Status	Max Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
L	01	O	20	20312	13:30:00	14:20:00	EQUAJ J201	M W F	N	Richard	Bryant	Miles

Course 3

Course Codes	Code	Number	Subletter	Home Dept?
	MAE	551		Y

Max. Enrollment	20
May PDF?	N
May Audit?	Y

Title: Fluid Mechanics
Topic:
Subletter:

Assignments:
Website:
Final Exam Type: Other

Description: An introduction to fluid mechanics. The course explores the development of basic conservation laws in integral and differential form; one-dimensional compressible flows, shocks and expansion waves; effects of energy addition and friction; unsteady and two-dimensional flows and method of characteristics. Reviews classical incompressible flow concepts, including vorticity, circulation, and potential flows. Introduces viscous and diffusive phenomena.

Grading

Perc.	Type

Sample Reading List

Author Name	Title

Sections

Format	Number	Status	Max Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
L	01	O	20	20318	10:00:00	11:20:00	EQUAJ J201	M W F	N	Garry	Leslie	Brown

Course 1

Course Codes	Code	Number	Subletter	Home Dept?
	CEE	361		Y
	MAE	325		N

Max. Enrollment	20
May PDF?	Y
May Audit?	N
Assignments	Eight homework sets, two midterm exams, one final project.

Title: Structural Analysis and Introduction to Finite Element Methods

Topic:

Subletter:

Website	
Final Exam Type	Other
Grading	

Perc.	Type
30	MidTerm Exam
30	Design Project(s)
40	Problem Set(s)

Description: Basic concepts of matrix structural analysis. Direct stiffness method. Axial force member. Beam bending member. Formation of element stiffness matrix. Assembling of global stiffness matrix. Introduction of boundary conditions. Solution of linear algebraic equations. Special analysis procedures. The finite element method. Introduction and basic formulation. Plane stress and plane strain problems. Plate bending problems. The use and implementation of structural analysis and finite element computer codes using Mathlab is emphasized throughout the course.

Sample Reading List	Author Name	Title
	McGuire & Gallagher, John Wiley	Matrix Structural Analysis
	Kwon and Bang, CRC	The Finite Element Method Using MatLab
	Zienkiewicz, Taylor and Zhu; Elsevier	The Finite Element Method: Its Basis and Fundamentals

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
L	01	O	20	20236	11:00:00	12:20:00	FRIEN 109	T Th	N	Jean-Herve		Prevost
P	01	O	30	22365	19:30:00	22:20:00	FRIEN 007	Th	N	Nima		Rahbar
										Jean-Herve		Prevost
										Scott	Edward	Sanborn
P	02	X	25	22366	19:30:00	22:20:00	MCCOH B59	M	N	Nima		Rahbar

Course 2

Course Codes	Code	Number	Subletter	Home Dept?
	WWS	585	B	Y
	MAE	580		N

Max. Enrollment	20
May PDF?	Y
May Audit?	Y
Assignments	

Title: Topics in Science, Technology, and Environmental Policy

Topic: Living in a Greenhouse: Technology & Policy

Subletter:

Website	
Final Exam Type	Other
Grading	

Perc.	Type

Description: These are courses intended to help students develop and apply skills in the application of scientific, technological, and environmental analyses to problems of policy interest. Fall courses are numbered 585, Spring courses are numbered 586.

Sample Reading List	Author Name	Title

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
S	01	O	20	23080	19:00:00	22:00:00	ROBEH 015	M	N	Robert	Harry	Socolow

Course 3

Course Codes	Code	Number	Subletter	Home Dept?
	MAE	527		Y

Max. Enrollment	15
May PDF?	N
May Audit?	Y
Assignments	

Title: Physics of Gases

Topic:

Subletter:

Website	
Final Exam Type	Other
Grading	

Perc.	Type

Description: Physical and chemical topics of basic importance in modern fluid mechanics, plasma dynamics, and combustion science: statistical calculations of thermodynamic properties of gases; chemical and physical equilibria; adiabatic temperatures of complex reacting systems; quantum mechanical analysis of atomic and molecular structure and atomic-scale collision phenomena; transport properties; reaction kinetics, including chemical, vibrational, and ionization phenomena; and propagation, emission, and absorption of radiation.

Sample Reading List	Author Name	Title

Sections

Format	Number	Status	Max. Enrollment	SCORE Number	Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
L	01	O	15	20313	09:00:00	09:50:00	EQUAJ J201	M W F	N	Szymon		Suckewer

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Course Codes	Code	Number	Subletter	Home Dept?				Max. Enrollment	15				
								May PDF?	N				
	MAE	531		Y				May Audit?	Y				
Title	Combustion							Assignments					
Topic								Website					
Subletter								Final Exam Type	Other				
Description	Chemical thermodynamics, theory of chemical kinetics, oxidation of hydrogen and hydrocarbons, transport phenomena, conservation equations of chemically reacthing flows, Rankin-Hugoniot relations, laminar premixed and diffusion flames, turblent flames, detonation waves, droplet and spray combustion, ignition and extinction, flame stabilization and blowoff, pollutant chemistry.							Grading	Perc.	Type			
								Sample Reading List	Author Name		Title		
									SR Turns		An Introduction to Combustion; Concepts and Applications		
									I Glassman		Combustion		
									K. Kikao		Principles of Combustion		

Sections	Format	Number	Status	Max. Enrollment	SCORE Number	Meetings						Instructors		
							Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
	L	01	O	15	20314		15:00:00	16:20:00	FRIEN 202	M W	N	Chung	King	Law

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Course Codes	Code	Number	Subletter	Home Dept?				Max. Enrollment	15				
								May PDF?	Y				
	MAE	555		Y				May Audit?	Y				
Title	Non-Equilibrium Gas Dynamics							Assignments					
Topic								Website					
Subletter								Final Exam Type	Other				
Description	Noncontinuum descritpion of transport and reactive flow. The course examins mlecular collisions Bolzmunn equation, and Chapmann-Easkog expansion for near-equilibrium flows; flows with transnational, vibrational and chemical non-equiliburum; shock structure; and plasma with chemical reactions							Grading	Perc.	Type			
								Sample Reading List	Author Name		Title		
									GA Bird		Molecular Gas dynamics and direct simulation		
									WG Vincenti & CH Kruger Jr		Introduction to Physical Gas Dynamics		

Sections	Format	Number	Status	Max. Enrollment	SCORE Number	Meetings						Instructors		
							Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
	L	01	O	15	20315		11:00:00	12:20:00	FRIEN 306	M Th	N	Yiguang		Ju

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Course Codes	Code	Number	Subletter	Home Dept?				Max. Enrollment	15				
								May PDF?	N				
	MAE	553		Y				May Audit?	Y				
Title	Turbulent Flow							Assignments					
Topic								Website					
Subletter								Final Exam Type	Other				
Description	Physical and statistical descriptions of turbulence, and a critical review of phenomenological theories for turbulent flows. The course examines scales of motion; correlations and spectra; homogeneous turbulent flows; inhomogeneous shear flows; turbulent flows in pipes and channels; turbulent boundary layers; calculation methods for turbulent flows (Reynolds stress equations, LES, DNS); and current directions in turbulence research. This course is offered in alternate years.							Grading	Perc.	Type			
								Sample Reading List	Author Name		Title		

Sections	Format	Number	Status	Max. Enrollment	SCORE Number	Meetings						Instructors		
							Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
	L	01	O	15	20319		11:00:00	12:20:00	EQUAJ J201	T Th	N	Alexander	John	Smits

Course Codes	Code	Number	Subletter	Home Dept?			Max. Enrollment	15		
							May PDF?	N		
	MAE	564		Y			May Audit?	Y		
	MSE	512		N			Assignments			
Title	Structural Materials						Website			
Topic							Final Exam Type	Other		
Subletter							Grading	Perc.	Type	
Description	Stress/strain behavior of materials; dislocation theory and strengthening mechanisms; yield strength; materials selection. Fundamentals of plasticity, Tresca and Von Mieses yield criteria. Case study on forging: upper and lower bounds. Basic elements of fracture. Fracture mechanics. Mechanisms of fracture. The fracture toughness. Case studies and design. Fatigue mechanisms and life prediction methodologies.						Sample Reading List	Author Name		Title

Sections	Format	Number	Status	Max. Enrollment	SCORE Number	Meetings					Instructors		
						Beg. Time	End Time	Place	Days Day	TBA?	First	Middle	Last
	L	01	O	15	23592	15:00:00	16:20:00	COMPU 102	T Th	N	Winston	Oluwole	Soboyejo