

Spring 2014
Registration Announcement



The University of Tennessee

Space Institute

411 B. H. Goethert Parkway

Tullahoma, TN 37388-9700

888-822-8874 ext. 37228

www.utsi.edu

Spring 2014

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CALENDAR - 2014 SPRING SEMESTER

Priority Registration.....	October 7, 2013 – January 6, 2014
Admission to Candidacy Forms for Spring 2014 Commencement	December 3, 2013
Spring 2014 Graduation Application Deadline (submit online)	December 3, 2013
Graduation Fee Payment Deadline (MS \$30, PhD \$75).....	December 3, 2014
Late Registration and late fees begin	January 8, 2014
Classes begin.....	January 8, 2014
Last Day to final register, add, change grading options or drop without a “W”	January 17, 2014
Martin Luther King Holiday	January 20, 2014
Preliminary Thesis/Dissertation Review Deadline	February 28, 2014
Last day to schedule final exam (non-thesis/thesis/dissertation)	March 20, 2014
Register to attend the Graduate Hooding Ceremony (http://gradschool.utk.edu).....	March 20, 2014
Purchase cap and gown and order hood (865-974-3459)	March 20, 2014
Spring Break (No Classes).....	March 17 - 21, 2014
Spring Recess (No Classes)	April 18, 2014
Drop with a “W”	April 1, 2014
Last day to take final exam (non-thesis/thesis/dissertation)	April 3, 2014
Thesis/Dissertation Deadline 500 p.m. EST	April 17, 2014
Submit report of final examination (Pass/Fail) form	April 17, 2014
Deadline for Submission of Admission to Candidacy for students	
Graduating Summer 2014 and Graduation Application.....	April 25, 2014
All "INCOMPLETE" must be removed for Graduation.....	April 25, 2014
Classes End	April 25, 2014
Total Withdraw from the University Deadline	April 25, 2014
Study Period.....	April 28, 2014
Exam Period.....	April 29, 30 & May 1, 2014
Graduate Hooding Ceremony (UTK)	May 8, 2014
COMMENCEMENT (UTK)	May 7 - 10, 2014
Official Graduation Date.....	May 10, 2014

Second thesis/dissertation deadlines

Defense Completed by April 25, 2014

Second Deadline Application Submitted by April 25, 2014

[http://gradschool.utk.edu/forms/Second Deadline Graduation Application.pdf](http://gradschool.utk.edu/forms/Second%20Deadline%20Graduation%20Application.pdf)

Thesis/Dissertation Submission Deadline by May 23, 2014

(Student will receive diploma summer 2014 semester, but will not be required to register for thesis/dissertation credits)

SUMMER SEMESTER 2014

Priority Registration.....	TBD
Final Registration	TBD
Memorial Day Holiday	May 26, 2014
Classes begin.....	May 29, 2014
July 4 th Holiday	July 4, 2014
Classes End.....	August 8, 2014
Summer Graduation Date on Transcript (No Ceremony).....	August 9, 2014

Dates may be revised without notice. Please refer to the following sites for updates:

<http://gradschool.utk.edu/datedgraduation.shtml>

http://registrar.tennessee.edu/academic_calendar/index.shtml

**SPRING SEMESTER 2014
FINAL STUDY DAY AND EXAM SCHEDULE**

LAST DAY OF CLASSES.....April 25, 2014

STUDY PERIODApril 28, 2014

FINAL EXAMS

REGULAR CLASS TIME	(Same Classroom)	EXAM TIME
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1st Day – Tuesday, April 29, 2014

7:45 - 9:00	M/Th	7:45 - 9:45
10:45 - 12:00	M/Th	10:15 - 12:15
9:15 - 10:30	M/Th	1:00 - 3:00
2:30 - 3:45	M/Th	3:30 - 5:30

2nd Day – Wednesday April 30, 2014

9:15 - 10:30	Tu/Fri	7:45 - 9:45
10:45 - 12:00	Tu/Fri	10:15 - 12:15
1:00 - 2:15	Tu/Fri	1:00 - 3:00
2:30 - 3:45	Tu/Fri	3:30 - 5:30

3rd Day – Thursday May 1, 2014

7:45 - 9:00	Tu/Fri	7:45 - 9:45
1:00 - 2:15	M/Th	10:15 - 12:15

**** ATTENTION ****

ALL STUDENTS TAKING VIDEOTAPE COURSES
CONTACT INSTRUCTOR FOR DATE AND TIME OF FINAL EXAM

NO CLASSES WILL BE IN SESSION
AT THIS TIME

REGISTRATION ANNOUNCEMENT SPRING SEMESTER 2014

REGISTRATION PROCEDURE

GRADUATE ACADEMIC ADVISING

Graduate students should contact your departmental faculty to arrange an advising appointment. If you're not accepted into a specific program, the assistant to the dean of graduate studies or the designee may act as your advisor. When the web registration system asks if you've discussed your program with your advisor, you must answer yes to continue with the registration process.

REGISTRATION

Students will register at <http://my.utk.edu>. You will need to log in using your NetID and your NetID password. If you do not know your NetID and NetID password, go to <http://onestop.utk.edu/your-classes/registering-for-classes>.

*Log in to MyUTK. You can find a link by looking under "M" on the A-Z index (<http://www.utk.edu/alpha>) or by typing myutk.utk.edu directly into your browser. You will need to log in by typing utk\your NetID in the "username" field and then your NetID password in the "password" field.

*Before you attempt to register, clear and pay any financial holds (parking tickets, library fines, fees, etc.).

*Look under the "For Your Review" heading on the MyUTK portal page (located in the upper right-hand corner) for notification of any holds you may have.

*Once you are logged into "My UTK," scroll down to "UTK Student Registration Links." Click on "Search for Classes" to look up sections and then register.

*Print a copy of your schedule when you are finished registering.

If you have any questions, call the Office of the University Registrar at 865-974-2101 or contact Charlene Hane in Student Services room D-100, phone 931-393-7228, email chane@utsi.edu.

TOLL-FREE NUMBERS

For a specific office:	1-888-822-UTSI (8874) and the extension number.
For general information:	1-888-822-UTSI (8874)
Admissions Office:	1-888-822-UTSI (8874)-37213
Budget and Finance Office:	1-888-822-UTSI (8874)-37297
Student Services	1-888-822-UTSI (8874)-37228

APPLICATION FOR ADMISSION

No student will be allowed to register unless a completed Application for Admission to the Graduate School of the University of Tennessee, Knoxville (UTK) is on file in the Registrar's Office. An Application for Admission to the UTK Graduate School should be completed online at <http://admissions.utk.edu/graduate/apply.shtml> and must be accompanied by a \$60.00 non-refundable application fee, payable to The University of Tennessee Space Institute. All applicants are required to provide one official transcript of all undergraduate and graduate

records, GRE scores and 3 letters of recommendation when applying. International applicants will also need to include TOEFL scores. Please select UT Space Institute as your location for the Tullahoma location. Only online applications will be accepted by Graduate Admission Knoxville, TN.

Graduate Research Assistantships can be sent to the UTSI Admissions Office, MS-1, Tullahoma, TN 37388-9700. All applications should be accompanied by Undergraduate and Graduate transcripts, GRE and TOEFL (if international applicant) and 3 letters of recommendation (copies will suffice). All official transcripts and test scores should be sent to College Code 1843. A full admission will not be granted by Graduate Admissions until all official test scores and degree confirmation is received. Please contact Dee Merriman, Associate Director, at (931) 393-7213 or 888-822-UTSI if you have questions.

TOTAL WITHDRAWAL FROM THE UNIVERSITY

If, after registering for classes and either returning your fee payment or your Confirmation of Attendance form to the Bursar's Office, you decide not to enroll for this term, you must immediately notify Charlene Hane, Student Services, at UTSI. If you withdraw officially on or before a Change of Registration deadline, but after the no "W" deadline for a particular session, the grade of "W" will be issued.

GRADES

Students may obtain their grades through the web at MyUTK or contact Charlene Hane, Student Services, Office D-100, (931) 393-7228.

GRADUATE STUDENTS CHANGE OF REGISTRATION AFTER THE DEADLINE

To change registration in any way after the deadline, a graduate student must present a request, signed by the instructor(s) and adviser as evidence of their knowledge of the request to Charlene Hane, Student Services at UTSI. Graduate students must verify that ALL changes have been approved by their academic adviser. If the Office of Graduate Student Services approves the change of registration, the change will be noted on the student's permanent record. **THE DROP DEADLINE FOR GRADES AND THE DROP DEADLINE FOR FEE REFUNDS ARE NOT THE SAME.**

FULL-TIME STUDENTS

Students enrolled in at least 9 semester hours during the Fall/Spring semesters or 6 hours in the Summer term are considered full-time students. Research Assistants must be full-time students and also enroll in one of the MABE 595 seminars or a PHYS 599 seminar each term, unless a waiver is granted by the Associate Executive Director.

REMOVAL OF INCOMPLETE GRADES

All Incomplete Grades (I) must be removed prior to graduation. The instructor, in consultation with the student, decides the terms for the removal of the I, including the time limit for removal. If the I is not removed within one calendar year, the grade will be changed to an F. The course will not be counted in the cumulative grade point average until a final grade is assigned. No student may graduate with an I on the record. Students planning to graduate Spring Semester 2014 must remove all INCOMPLETE GRADES by **April 25, 2014**. Contact Charlene Hane, Student Services, to remove an Incomplete Grade.

REPEATING A COURSE

No graduate student may repeat a course for the purpose of raising a grade already received, with the exception of a NC course. A graduate student cannot do additional work nor repeat an examination to raise a final grade.

ADMISSION TO CANDIDACY

MASTER OF SCIENCE DEGREE:

Each M.S. student, including IE Capstone Project students, is responsible for submitting a completed and signed Admission to Candidacy Application at least one semester prior to receiving the degree.

Candidacy committee changes or course changes must be submitted to the committee chairman using a Revision form. If changing from a thesis option to a non-thesis option or vice versa, a new Admission to Candidacy Application must be submitted. All forms must be processed through Student Services.

DOCTORAL DEGREE:

A Doctoral Committee should be formed during the student's first year of doctoral study. Any changes to the doctoral committee (deletions or additions) must be submitted to the Committee Chairman using a Revision form for approval. Each doctoral student is responsible for submitting a completed Admission to Candidacy form signed by the doctoral committee at least one semester prior to receiving the degree. All forms must be processed through Student Services.

CONTINUOUS REGISTRATION OF DOCTORAL STUDENTS

Course 600 is reserved for doctoral research and dissertation hours. Initial registration for 600 should be determined by each department and generally corresponds to the time at which a student begins work actively on dissertation research. From this time on, students are required to register continuously for at least 3 hours of 600 each semester, including summer term. A minimum total of 24 hours of course 600 is required.

A student who will not be using faculty services and/or university facilities for a period of time may request leaves of absence from dissertation research up to a maximum of six terms (including summer terms). The request (form found online at http://gradschool.utk.edu/forms/leaveofabsence_reader.pdf) should be completed by the student and then sent to the major professor (advisor) for endorsement. The completed form is then submitted to Graduate School for review and processing.

FINAL EXAM FOR NON-THESIS, CAPSTONE PROJECT STUDENTS, THESIS AND DISSERTATION STUDENTS

A candidate presenting a thesis or dissertation must pass a final oral examination on all work offered for the degree. The examination is scheduled through Student Services. Failure to notify Student Services of the examination date will put the student at risk for graduating that semester. Final examinations not properly scheduled MUST be repeated. The final draft of the thesis must be distributed to the committee members at least two weeks prior to the date of the final examination. In case of a grade of "Fail", the candidate may not apply for re-examination until the following semester. The result of the second examination is final.

UT POLICY ON INSURANCE FOR INTERNATIONAL STUDENTS

All foreign national students registered with the University of Tennessee, Knoxville, are required to have comprehensive medical insurance. The policy for the 2013-2014 academic year is provided by United HealthCare Student Resources. The premium must be paid before registration. Contact the Human Resources Office (A-104 ext. 37267) for further information.

GENERAL SEMINAR

A number of seminars of interest to all UTSI students and general public will be offered throughout the semester.

FINAL EXAM DATES

STUDY PERIOD – April 28, 2014

FINAL EXAMS – April 29, 30, & May 1, 2014

FINANCIAL CALENDAR, FEES, REFUNDS, AND TUITION

Please click [FEES](#) link to the most current information. You may also contact Jennifer Boyles in the Business and Finance Office at jboyles@utsi.edu or phone number 931-393-7297.

HONOR STATEMENT

The following Honor Statement is signed by all students applying to The Graduate School:

"An essential feature of The University of Tennessee, Knoxville is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the University, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity."

For official information on all UTK Graduate School policies, refer to the current UTK Graduate Catalog available at <http://catalog.utk.edu>. The student handbook "Hilltopics" is available in Student Services, D-100 or online at <http://dos.utk.edu/hilltopics>.

The University of Tennessee Space Institute reserves the right to cancel any class with an insufficient number of students, or for other reasons.

THE UNIVERSITY OF TENNESSEE POLICY ON A DRUG-FREE CAMPUS AND WORKPLACE

In support of the Drug-Free Workplace Act of 1998 (Public Law 100-690) and the Drug-Free Schools and communities Act of 1989, the University of Tennessee is notifying all students, faculty, and staff of the following university policy approved by the UT Board of Trustees on 21 June 1990.

It is the policy of the University of Tennessee to maintain a safe and healthful environment for its students and employees. Therefore, university policy prohibits the unlawful use, manufacture, possession, distribution, or dispensing of drugs ("controlled substances" as defined in the Controlled Substances Act, 21 U.S.C. 812) and alcohol on university property or during university activities.

Violation of this policy is grounds for disciplinary action--up to and including immediate discharge for an employee and permanent dismissal of a student. Federal and state laws provide additional penalties for such unlawful activities, including fines and imprisonment (21 U.S.C. 841 et seq.; T.C.A. 39-6-401 et seq.). Local ordinances also provide various penalties for drug- and alcohol-related offenses. The university is bound to take all appropriate actions against violators, which may include referral for legal prosecution or requiring the individual to participate satisfactorily in an approved drug use or alcohol abuse assistance or rehabilitation program.

**THE UNIVERSITY RESERVES THE RIGHT TO REVISE
ANY INFORMATION LISTED IN THIS TIMETABLE OF CLASSES**

**The University of Tennessee Space Institute
Spring 2014 Course Listings**

AEROSPACE ENGINEERING

AE	500	Master's Thesis (1-15)	
SEC.	009	CRN 24688	Abedi
	011	CRN 24689	Antar
	012	CRN 24690	Anusonti-Inthra
	013	CRN 24691	Flandro
	014	CRN 24692	Majdalani
	015	CRN 24693	Moeller
	021	CRN 24699	Solies
	022	CRN 26023	Vakili
	016	CRN 24694	Zhang

Grading Restriction: P/NP only.

Repeatability: May be repeated.

Credit Level Restriction: Graduate credit only.

Registration Restriction(s): Minimum student level – graduate.

AE	502	Registration for Use of Facilities (1-15)	
SEC.	002	CRN 24701	Moeller

Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated.

Credit Restriction: May not be used toward degree requirements.

Credit Level Restriction: Graduate credit only.

Registration Restriction(s): Minimum student level – graduate

AE	512	Viscous Flow (3)	
SEC.	001	CRN 24702	
TEXT:	Frank M. White; <i>Viscous Flow</i> ; 3 rd Ed.		
TIME:	Tuesday & Thursday	2:40 – 3:55	E-110
PROFESSOR:	Dr. Ahmad Vakili & Dr. FengYuan Zhang		

Review of general viscous fluid properties and constitutive equations. Derivation of fundamental equations of compressible viscous flow; boundary conditions for viscous heat-conducting flow; exact solutions for Newtonian viscous flow, (Navier-Stokes) equations, for special cases; similarity solutions for N-S equations. 2-D laminar boundary Layer equations, Thermal boundary layers, stability of laminar flows, transition to turbulence, 2-D turbulent boundary layer equations. Incompressible-turbulent mean flow, and compressible boundary layer flow.

Registration Permission: AE 511 or Consent of instructor.

AE 517 Finite Elements for Engineering Applications (3)
SEC. 001 CRN 29685 (Same as BME 517 001 CRN 29686 and ME 517 001 CRN 29649)
TEXT: TBD

TIME: TBD
PROFESSOR: Dr. Reza Abedi

Modern computational theory applied to conservation principles across the engineering sciences. Weak forms, extremization, boundary conditions, discrete implementation via finite element, finite difference, finite volume methods. Asymptotic error estimates, accuracy, convergence, stability. Linear problem applications in 1, 2 and 3 dimensions, extensions to non-linearity, non-smooth data, unsteady, spectral analysis techniques, coupled equation systems. Computer projects in heat transfer, structural mechanics, mechanical vibrations, fluid mechanics, heat/mass transport.

Cross-listed: (Same as Aerospace Engineering 517; Biomedical Engineering 517.)

Comment(s): Bachelor's degree in engineering or natural science required.

Registration Permission: Consent of instructor.

AE 522 Aerodynamics of Compressible Fluids II (3)
SEC. 001 CRN 26620
TEXT: John D. Anderson; *Modern Compressible Flow: With Historical Perspectives*; 3rd Edition; McGraw Hill; ISBN 0-07-242443-5.

H.W. Leipmann and A. Roshko; *Elements of Gasdynamics*; Dover Publications; ISBN-10: 0486419630; ISBN-13: 978-0486419633

> [Visit Amazon's H. W. Liepmann Page](#)

TIME: Tuesday & Thursday 10:10 – 11:25 E-110
PROFESSOR: Dr. Trevor Moeller

One-dimensional internal and external flow; waves; small perturbation theory; slender body theory; similarity rules; method of characteristics.

(DE) Prerequisite(s): 521.

AE 590 Selected Engineering Problems (2-6)
SEC. 001 CRN 24707 Abedi
003 CRN 24708 Antar
004 CRN 26623 Anusonti-Inthra
005 CRN 26624 Flandro
006 CRN 26625 Majdalani
007 CRN 26626 Moeller
008 CRN 26627 Solies
009 CRN 26628 Vakili
010 CRN 29615 Zhang

Repeatability: May be repeated. Maximum 6 hours.

Comment(s): Enrollment limited to students in problems option.

Registration Permission: Consent of advisor.

AE 595 Aerospace Engineering Seminar (1)
SEC. 001 CRN 24709
TEXT: None
TIME: Will be announced through email
PROFESSOR: Dr. Ahmad Vakili

All phases of aerospace engineering, reports on current research at the University of Tennessee, Knoxville, and UTSI.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated. Maximum 20 hours.

AE 599 Special Topics in AE: Aircraft Design (Same as AVSY 506 001 CRN 24785) (3)
SEC. 001 CRN 24711 (Video Recorded)
TEXT: D. P. Raymer; *Aircraft Design: A Conceptual Approach*; AIAA Education Series, 3rd Edition 1998, or later; ISBN 1-56347-281-0
TIME: Tuesday & Friday 1:00 – 2:15 E-111
PROFESSOR: Dr. Peter Solies

Design process, compromise of conflicting requirements, economical, industrial, and legal aspects. Definition of mission requirements, synthesis and optimization techniques, safety and reliability, systems integration, standards and regulations, teamwork, and decision-making process.

Repeatability: May be repeated. Maximum 6 hours.

AE 599 Special Topics in AE: Finite Volume Methods for Fluids and Plasmas (3)
SEC. 003 CRN 28618 (Same as ME 599 005 CRN 28700)
TEXT: Textbook: Lecture Notes; Supplemental Text: *Finite Volume Methods for Hyperbolic Problems*, Randall J. LeVeque, Cambridge University Press, 2002. ISBN-10: 0521009243, ISBN-13: 978-0521009249
TIME: Tuesday & Friday 1:00 – 2:15 E-113
PROFESSOR: Dr. Trevor Moeller

This course is designed as a modern introduction to shock-capturing finite volume methods in one and two dimensions for viscous, compressible gasdynamics and magnetohydrodynamics. Topics include: conservation and non-conservation forms of the governing equations, smooth and non-smooth solutions, waves, shocks and discontinuities, the weak form, mathematical properties of the governing equations, discretization of space, flux vector implementation and upwinding, flux-differencing and flux-vector splitting methods, the Riemann problem and Riemann solver approaches, viscous term treatment, gradient reconstruction, gradient limiting, accuracy, convergence, stability, consistency, explicit and implicit techniques, boundary conditions. Student projects using example codes provided by the instructors will constitute a large part of the coursework. Projects may be tailored to fit student research interests. Students interested in computational fluid dynamic modeling of either compressible gasdynamics and/or plasmas are encouraged to attend.

(DE) Prerequisite(s): AE 521, MA 435 or consent of instructor.

Registration Restriction(s): Minimum student level – graduate.

Registration Permission: Consent of instructor.

Repeatability: May be repeated. Maximum 6 hours.

AE 599 Special Topics in AE: Aircraft Flight Controls (Same as AVSY 516 001 CRN 24788) (3)
SEC. 005 CRN 26449 (Video Recorded)
TEXT: Nelson, Robert C; *Flight Stability and Automatic Control*; 2nd Edition 1988 or later; McGraw-Hill, NY; ISBN 0-07-046273-9

TIME: Wednesday
PROFESSOR: Dr. Peter Solies

1:00 – 3:30

E-111

Static and dynamic longitudinal, directional, and lateral stability of aerospace vehicles will be investigated. Topics include contribution of vehicle components to stability and control, motion with fixed and free control surfaces, steady flight and maneuvering flight, flight test techniques, and introduction to control theory and design of automatic controls.

Repeatability: May be repeated. Maximum 6 hours.

AE 599 Special Topics in AE: Applied Numerical Analysis for PDE (3)

SEC. 006 CRN 26198 (Same as ME 599 002 CRN 28619)

TEXT *Finite Difference and Spectral Methods for Ordinary and Partial Differential Equations*, Lloyd N. Trefethen, free online at <http://www.maths.ox.ac.uk/people/profiles/nick.trefethen>; *Finite Element Method: Linear Static and Dynamic Finite Element Analysis*, Thomas J. R. Hughes (Dover Publications); *Finite Volume Methods for Hyperbolic Problems*, by Randall J. LeVeque, D. G. Crighton (Series Editor) (Cambridge Texts in Applied Mathematics)

TIME: TBD

PROFESSOR: Dr. Anusonti-Inthra

This class studies algorithms for numerically solving Partial Differential Equations with the focus in applications in the area of computational mechanics. Different types of algorithms for solving PDE will be studied; including time marching method, Finite Difference Method, Finite Volume Method, Finite Element Method. Both 1D and 2D problems will be covered. Examples of the equations to be solved are First and second order system of ODE, wave equation, Euler equation, heat equation, advection-diffusion equation, Poisson equation. Various aspects of the above numerical analysis methods will be covered including accuracy, stability, convergence. If time permits, additional topics will be included such as discretization method, adaptive method, and parallel computing. A review of linear algebra (direct, iterative solvers and eigenvalue problem) will be provided. Students are expected to be proficient in Matlab (preferred) or C or Fortran.

Repeatability: May be repeated. Maximum 6 hours.

AE 599 Special Topics in AE: Applied Computational Fluid Dynamics II (3)

SEC. 008 CRN 27481 (Same as ME 599 006 CRN 27240)

TEXT: No required text

TIME: Monday & Wednesday

11:40 – 12:55

E-110

PROFESSOR: Dr. Greg Power

This course incorporates fundamental application of CFD, grid generation and post-processing codes that are widely accepted and used in industry and government labs as a hands-on introduction to computational fluid dynamics. The course will build on the knowledge and experience gained during the 1st semester (Part-I) to develop skills for simulating more complex problems using advanced physical/turbulence models. The student will be expected to complete at least one complex CFD project and prepare a detailed report and presentation of the project efforts and results. Potential topics that will be covered include: Grid generation on (for) complex geometries; Development of custom routines/subroutines; Verification and Validation of CFD results; Advanced thermodynamic models; Chemical kinetics; Time dependent flows; Advanced turbulence modeling; Advanced post-processing techniques; Parallel processing; Other topics as may be helpful by the instructor.

Repeatability: May be repeated. Maximum 6 hours.

AE 600 Doctoral Research/Dissertation (3-15)
 SEC. 006 CRN 24718 Abedi
 007 CRN 24719 Antar
 008 CRN 24720 Anusonti-Inthra
 009 CRN 24721 Flandro
 010 CRN 24722 Majdalani
 015 CRN 26629 Moeller
 017 CRN 24727 Solies
 018 CRN 26323 Vakili
 013 CRN 24725 Zhang

Grading Restriction: P/NP only.

Repeatability: May be repeated.

Registration Restriction(s): Minimum student level – graduate.

AE 690 Advanced Topics in Aerospace Engineering: PhD Qualifying Exam (3)
 SEC. 001 CRN 28665
 TEXT: TBD

TIME: TBD

PROFESSOR: Dr. Matthew Mench

Repeatability: May be repeated. Maximum 9 hours.

Registration Restriction(s): Minimum student level – graduate.

Registration Permission: Consent of instructor.

AE 690 Advanced Topics in Aerospace Engineering: Cyclonic Flow Physics (3)
 SEC. 004 CRN 28924

TEXT: Classic book references in Physics and Engineering on the subject matter, including references in current literature.

TIME: TBD

PROFESSOR: Dr. Christian Parigger

This advanced topics course will focus on independent studies of fundamentals and of the Physics of effectively inviscid flow with vorticity, especially cyclonic and anti-cyclonic systems, including applications of fluid vortices for propulsion.

Repeatability: May be repeated. Maximum 9 hours.

Registration Restriction(s): Minimum student level – graduate.

Registration Permission: Consent of instructor.

AVIATION SYSTEMS

AVSY 500 Master's Thesis (1-15)
 SEC. 001 CRN 24777 Martos
 003 CRN 24778 Solies

Grading Restriction: P/NP only.

Repeatability: May be repeated.

Credit Level Restriction: Graduate credit only.
Registration Restriction(s): Minimum student level – graduate.

AVSY 502 Registration for Use of Facilities (1-15)
SEC. 001 CRN 24781 Martos
003 CRN 24782 Solies

Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated.

Credit Restriction: May not be used toward degree requirements.

Credit Level Restriction: Graduate credit only.

Registration Restriction(s): Minimum student level – graduate.

AVSY 506 Aircraft Design (Same as AE 599 001 CRN 24711) (3)
SEC. 001 CRN 24785 (Video Recorded)
TEXT: D. P. Raymer; *Aircraft Design: A Conceptual Approach*; AIAA Education Series, 3rd Edition
1998, or later; ISBN 1-56347-281-0
TIME: Tuesday & Friday 1:00 – 2:15 E-111
PROFESSOR: Dr. Peter Solies

Design process, compromise of conflicting requirements, economical, industrial, and legal aspects. Definition of mission requirements, synthesis and optimization techniques, safety and reliability, systems integration, standards and regulations, teamwork, and decision-making process.

AVSY 516 Aircraft Flight Controls (Same as AE 599 005 CRN 26449) (3)
SEC. 001 CRN 24788 (Video Recorded)
TEXT: Nelson, Robert C; *Flight Stability and Automatic Control*; 2nd Edition 1988 or later; McGraw-Hill, NY; ISBN 0-07-046273-9
TIME: Wednesday 1:00 – 3:30 E-111
PROFESSOR: Dr. Peter Solies

Static and dynamic longitudinal, directional, and lateral stability of aerospace vehicles will be investigated. Topics include contribution of vehicle components to stability and control, motion with fixed and free control surfaces, steady flight and maneuvering flight, flight test techniques, and introduction to control theory and design of automatic controls.

AVSY 521 Experimental Flight Mechanics: Fixed Wing Performance (3)
SEC. 001 CRN 24789
TEXT: *Flight Testing of Fixed Wing Aircraft*; Ralph D. Kimberlin; AIAA; First Edition;
ISBN 1-56347-564-2
TIME: Tuesday & Friday 10:30 – 11:45 Airport Classroom
PROFESSOR: Dr. Borja Martos

Fundamental theories, flight test techniques, and data collection and analyses for fixed wing aircraft performance. Topics: air data system calibration, takeoff and landing performance, turn performance, cruise performance, energy concepts, and aerodynamic modeling. Weekly classroom academics with approximately 4-6 flight labs.

(RE) Prerequisite(s): 503 or Aerospace Engineering 515.

AVSY 526 Introduction to Avionics II (3)
SEC. 001 CRN 29645 (Video Recorded)
TEXT: *Principles of Avionics*; 7th Edition; Albert Helfrick; Avionics Communications
(<http://www.avionics.com>); ISBN 13:9781885544278
TIME: Tuesday & Friday 9:15 – 10:30 E-113
PROFESSOR: Dr. Monty Smith

Electronic instrumentation, navigation, communication, guidance and control systems used in aviation. The primary topics to be covered in the second semester include: surveillance systems, airborne communication systems, onboard communications, indicators, air data sensors, and flight control systems. (DE) Prerequisite(s): 525.

AVSY 550 Project in Aviation Systems (3)
SEC. 001 CRN 24790 Martos
003 CRN 24791 Solies

Repeatability: May be repeated. Maximum 15 hours.
Credit Restriction: Maximum of 3 hours may be applied toward degree requirements.
Comment(s): Non-thesis aviation systems majors only.
Credit Level Restriction: Graduate credit only.
Registration Restriction(s): Minimum student level - graduate.

BIOMEDICAL ENGINEERING

BME 500 Master's Thesis (1-15)
SEC. 012 CRN 27325 Johnson

Grading Restriction: P/NP only.
Repeatability: May be repeated.
Credit Level Restriction: Graduate credit only.
Registration Restriction(s): Minimum student level – graduate.

BME 517 Finite Elements for Engineering Applications (3)
SEC. 001 CRN 29686 (Same as AE 517 001 CRN 29685 and ME 517 001 CRN 29649)
TEXT: TBD

TIME: TBD
PROFESSOR: Dr. Reza Abedi

Modern computational theory applied to conservation principles across the engineering sciences. Weak forms, extremization, boundary conditions, discrete implementation via finite element, finite difference, finite volume methods. Asymptotic error estimates, accuracy, convergence, stability. Linear problem applications in 1, 2 and 3 dimensions, extensions to non-linearity, non-smooth data, unsteady, spectral analysis techniques, coupled equation systems. Computer projects in heat transfer, structural mechanics, mechanical vibrations, fluid mechanics, heat/mass transport.

Cross-listed: (Same as Aerospace Engineering 517; Biomedical Engineering 517.)
Comment(s): Bachelor's degree in engineering or natural science required.
Registration Permission: Consent of instructor.

BME 590 Selected Biomedical Engineering Problems (2-6)
SEC. 001 CRN 28748 Johnson

Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 6 hours.
Comment(s): Enrollment is limited to students in the non-thesis option.
Credit Level Restriction: Graduate credit only.
Registration Restriction(s): Minimum student level – graduate.
Registration Permission: Consent of instructor.

BME 595 Biomedical Seminar (1)
SEC. 002 CRN 27513
TEXT: None
TIME: Will be announced through email
PROFESSOR: Dr. Jacqueline Johnson

All phases of biomedical engineering, reports on current research at UTK and UTSL.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 20 hours.
Credit Level Restriction: Graduate credit only.
Registration Restriction(s): Minimum student level – graduate

BME 600 Doctoral Research/Dissertation (3-15)
SEC. 011 CRN 27326 Johnson

Grading Restriction: P/NP only.
Repeatability: May be repeated.
Registration Restriction(s): Minimum student level – graduate.

BME 610 Advanced Topics in BME: Medical Imaging (3)
SEC. 005 CRN 28616
TEXT: *Handbook of Medical Imaging*; Volume 1; Physics and Psychophysics; Editors Jacob Beutel, Harold L. Kundel, Richard L. Van Metter. *Materials* 2011, 4, 1034-1086; doi:3390/ma4061034
TIME: Monday & Friday 2:30 – 3:45 F-253
PROFESSOR: Dr. Jacqueline Johnson

This course will truly be graduate research based on the current interests of the instructor. The purpose is to take the field further as a group in an area that concentrates on the strengths of the participants. The first two weeks will explain some basic concepts in medical imaging, which will be made as palatable as possible for the non-mathematician. From then on the instruction and discussion will pertain to real imaging systems – some but not all will be aligned to the glass ceramic studies at UTSL. There will be no final exam but students will have a choice as to whether to work on the design of some component of an imaging system or detection media or to participate in laboratory research gathering results towards a paper.
Current research topics of interest in biomedical engineering.
Repeatability: May be repeated. Maximum 9 hours.
Registration Restriction(s): Minimum student level – graduate.
Registration Permission: Consent of instructor.

ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

ECE 600 Doctoral Research/Dissertation (3-15)
SEC. 030 CRN 28175 Bomar

Grading Restriction: P/NP only.

Repeatability: May be repeated.

Registration Restriction(s): Minimum student level – graduate.

ENGINEERING MANAGEMENT

EM 500 Master's Thesis (1-15)
SEC. 001 CRN 29650 Simonton

Grading Restriction: P/NP only.

Repeatability: May be repeated.

Credit Level Restriction: Graduate credit only.

Registration Restriction(s): Minimum student level – graduate.

EM 501 Capstone Project (3-6)
SEC. 001 CRN 22371
PROFESSOR: Dr. James L. Simonton

Application-oriented project to show competence in major academic area.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated. Maximum 6 hours.

Comment(s): Requires enrollment in engineering management.

Credit Level Restriction: Graduate credit only.

Registration Restriction(s): Minimum student level – graduate.

EM 501 Capstone Project (3-6)
SEC. 002 CRN 29651
PROFESSOR: Dr. Andrew Yu

Application-oriented project to show competence in major academic area.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated. Maximum 6 hours.

Comment(s): Requires enrollment in engineering management.

Credit Level Restriction: Graduate credit only.

Registration Restriction(s): Minimum student level – graduate.

EM 502 Registration for Use of Facilities (1-15)
SEC. 001 CRN 22372 Simonton

Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated.

Credit Restriction: May not be used toward degree requirements.

Credit Level Restriction: Graduate credit only.

Registration Restriction(s): Minimum student level – graduate.

EM 533 Theory and Practice of Engineering Management (3)
SEC. 001 CRN 22373 Students participating at Tullahoma classrooms
002 CRN 22374 Students participating by distance ed.
003 CRN 22375 Students participating at Knoxville DE classrooms

TEXT: *Paradigms: The Business of Discovering the Future*, J. A. Barker, (1993), Harper Business Press, New York, ISBN# 10: 0887306470 13: 978-0887306471
Productive Workplaces Revisited: Dignity, Meaning and Community in the 21st Century, M. R. Weisbord, (2004) Pfeifer, ISBN # 0787971170

TIME: Thursday 4:00 – 6:30 E-113

PROFESSOR: Dr. James L. Simonton

Principles of engineering management, including: business and organization design, culture, leadership, marketing and competition in global economy, motivation and performance management, empowerment, organizational behavior, and diversity. Systems thinking, learning organizations, and systems dynamics modeling. Principle application to work settings and case studies.

EM 534 Financial Management for Engineering Managers (3) (Video Recorded)
SEC. 001 CRN 22377 Students participating at Tullahoma classrooms
002 CRN 22378 Students participating by distance ed.
003 CRN 22379 Students participating at Knoxville DE classrooms

TEXT: *Introduction to Management Accounting*, C. T. Horngren, G.L. Sundem, W.O. Stratton, D. Burgstahler, and J.O. Schatzberg (2010), 15th edition, Prentice Hall, NJ. ISBN # 10: 0136102654, ISBN 13: 978-0136102656

TIME: Wednesday 4:00 – 6:30 E-113

PROFESSOR: Dr. Andrew Yu

Financial and managerial accounting in engineering and technology management. Transaction recording, financial statements, ratios and analysis, activity-based accounting, and standard practices for costing, budgeting, assessment, and control.

EM 538 New Venture Formation (3)
SEC. 001 CRN 29661 Students participating at Tullahoma classrooms
002 CRN 29662 Students participating by distance ed.
003 CRN 29663 Students participating at Knoxville DE classrooms

TEXT: *Technology Ventures: From Idea to Enterprise*, Thomas H. Byers, Richard C. Dorf, Andrew Nelson, (2011), 3rd edition, McGraw-Hill, ISBN # 13: 9780073380186

TIME: Tuesday 4:00 – 6:30 E-113

PROFESSOR: Dr. James Simonton

Factors other than mechanical or chemical which enter into successful establishment of manufacturing or service enterprise. Organizational and financial planning and evaluation. Cost and location studies and market analysis to determine commercial feasibility of new ventures.

(RE) Prerequisite(s): 539.

EM 541 Managing Change and Improvement in Technical Organizations (3) (Video Recorded)
 SEC. 001 CRN 22381 Students participating at Tullahoma classrooms
 002 CRN 22382 Students participating by distance ed.
 003 CRN 22383 Students participating at Knoxville DE classrooms
 TEXT: *Organizational Behavior*; Fred Luthans; McGraw-Hill Irwin; 12th Edition;
 ISBN 13: 9780073530352 (required text). *Good to Great*; Jim Collins; Harper Collins;
 1ST Edition (2001) ISBN 10: 0066620996 (optional text). *Who Moved My Cheese*; Spencer
 Johnson; New York: Putnam; 1998 Edition; ISBN 10: 0399144463 (optional text)
 TIME: Monday 4:00 – 6:30 E-113
 PROFESSOR: Dr. Denise Jackson

Current topics, theories, and applications for managing change and innovation for performance improvement in organizations. Multi-initiative approaches: quality management, organizational effectiveness, employee empowerment, performance measurement, and application of statistical tools and techniques. Self-assessment and Baldrige criteria for performance excellence. Change agent, team building, and leadership issues. Case studies.
 (RE) Prerequisite(s): *Industrial Engineering 516*

EM 600 Doctoral Research/Dissertation (3-15)
 SEC. 001 CRN 26286 Simonton

Grading Restriction: P/NP only.

Repeatability: May be repeated.

Registration Restriction(s): Minimum student level – graduate.

INDUSTRIAL ENGINEERING

IE 517 Reliability of Lean Systems
 SEC. 001 CRN 28645 UTK students participating at Knoxville DE classrooms
 002 CRN 28646 UTK students participating elsewhere
 003 CRN 28690 UTSI students participating elsewhere
 TIME: TBD
 TEXT: Lecture notes
 PROFESSOR: Dr. Robert Keyser

Course is divided into two major components. First half of the course will focus on introducing the students to the concepts of reliability and maintainability and the impact of lean on the reliability of complex systems. The concepts of reliability engineering are utilized to address lean system failures, including equipment failures, human failures, material failures and scheduling failures. Will develop the ability to design systems that are both lean and reliable. The second half of the course will introduce students to specific case studies of systems failures and ask student to develop solutions by considering different dimensions including financial, technical feasibility, risk, safety, security and others. Multi criteria decision making methodologies will be presented to allow students to make decisions when different criteria lead to conflicting solutions.

(RE) Prerequisite(s): *516*.

Recommended Background: Background in lean and reliability.

IE 518 Advanced Engineering Economic Analysis (3)
 SEC. 001 CRN 22048 UTK students participating at Knoxville DE classrooms
 002 CRN 22049 UTK students participating elsewhere
 003 CRN 22050 UTSI participating elsewhere

TIME: Wednesday
TEXT: TBD

1:30 – 3:30

E-113

PROFESSOR: Dr. Andrew Yu

Application of engineering economic analysis in complex decision situations. Inflation and price changes; uncertainty evaluation using non-probabilistic techniques; capital financing and project allocation; evaluations involving equipment replacement, investor-owned utilities, and public works projects; probabilistic risk analysis including computer simulation and decision trees; multi-attribute decision analysis; and other advanced topics.

(RE) Prerequisite(s): 405.

Recommended Background: Statistics 251.

IE 522 Optimization Methods in Industrial Engineering (3) (Video Recorded)
SEC. 001 CRN 22052 UTK students participating at Knoxville DE classrooms
002 CRN 22053 UTK students participating elsewhere
003 CRN 22054 UTSI students participating elsewhere

TIME: TBD

TEXT: *Operations Research: Applications and Algorithms*, Wayne Winston, CENGAGE Learning; 4th Edition; ISBN # 10: 0534380581 or 13: 9780534380588

PROFESSOR: Dr. Mingzhou Jin

Classical optimization applied to constrained and unconstrained, non-linear, multi-variable functions; search techniques; decision making under uncertainty; game theory; and dynamic programming.

(RE) Prerequisite(s): Engineering Management 537.

Recommended Background: 301.

IE 550 Graduate Seminar (1)
SEC. 003 CRN 28691

TIME: TBD

TEXT: TBD

PROFESSOR: Dr. Mingzhou Jin

Seminar provides an opportunity for Master's and Doctoral students to acquaint themselves with research being conducted by both faculty and graduate students in the Industrial and Systems Engineering Department, as well as select campus-wide and off-campus researchers from both academia and industry. Research work and relevant results are presented in a professional environment that promotes continued interaction among interested parties. Presentations are not restricted to thesis and dissertation work.

Grading Restriction: Satisfactory/No Credit grading only.

Comment(s): Admission to graduate program required.

IE 691 Stochastic Programming (3)
SEC. 004 CRN 26362 UTK students participating at Knoxville DE classrooms
005 CRN 29904 UTK students participating elsewhere
006 CRN 29905 UTSI students participating elsewhere

TIME: Thursday

TEXT: TBD

PROFESSOR: Dr. Oleg Shylo

Forum to study individually or in groups.

Repeatability: May be repeated if topic differs. Maximum 6 hours.

Comment(s): Requires graduate standing.

Registration Restriction(s): Minimum student level – graduate.

Registration Permission: Consent of instructor.

MATHEMATICS

MATH 435 Partial Differential Equations (3)

SEC. 002 CRN 20437

TEXT: Richard Haberman; *Applied Partial Differential Equations with Fourier Services and Boundary Value Problems*; 4th Edition; Prentice Hall; ISBN 013-065243-1

TIME: Tuesday 2:00 – 4:30 F-253

PROFESSOR: Dr. Jan Zijlstra

Separation of variables, Fourier series, solution of Laplace, wave, and heat equations.

(RE) Prerequisite(s): 231; 241 or 247.

MATH 512 Methods in Applied Mathematics II (3)

SEC. 001 CRN 29703 (Video Recorded)

TEXT: *Applied Analytic Mathematics for Physical Scientists*; Cushing; Wiley; 2nd Edition.

Essential Mathematical Methods for the Physical Sciences; K.F. Riley and M.P. Hobson; Cambridge University Press.

TIME: Monday & Thursday 1:00 – 2:15 E-113

PROFESSOR: Dr. Horace Crater

Fundamentals and techniques associated with continuous models of physical, engineering, and biological systems: development, solution and qualitative analysis of ordinary and partial differential equations, and calculus of variations.

(DE) Prerequisite(s): 511.

MECHANICAL ENGINEERING

ME 500 Master's Thesis (1-15)

SEC. 001 CRN 21930 Abedi
021 CRN 21950 Antar
022 CRN 21951 Anusonti-Inthra
023 CRN 21952 Flandro
024 CRN 21953 Majdalani
025 CRN 21954 Moeller
026 CRN 21955 Solies
034 CRN 26898 Vakili
035 CRN 29630 Zhang

Grading Restriction: P/NP only.

Repeatability: May be repeated.

Credit Level Restriction: Graduate credit only.

Registration Restriction(s): Minimum student level – graduate.

ME 502 Registration for Use of Facilities (1-15)

SEC. 002 CRN 26350 Moeller

Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated.

Credit Restriction: May not be used toward degree requirements.

Credit Level Restriction: Graduate credit only.

Registration Restriction(s): Minimum student level – graduate.

*ME 512 Heat Transfer II **CANCELLED**

SEC. 001 CRN 21966

TEXT: TBD

TIME: TBD

PROFESSOR: Dr. George Murray

Analysis of steady-state and time-dependent heat conduction by numerical methods. Analysis of laminar and turbulent convection heat transfer in internal and external flows, forced and buoyancy driven flows. (DE) Prerequisite(s): 541.

ME 517 Finite Elements for Engineering Applications (3)

SEC. 001 CRN 29649 (Same as AE 517 001 CRN 29685 and BME 517 001 CRN 29686)

TEXT: TBD

TIME: TBD

PROFESSOR: Dr. Reza Abedi

Modern computational theory applied to conservation principles across the engineering sciences. Weak forms, extremization, boundary conditions, discrete implementation via finite element, finite difference, finite volume methods. Asymptotic error estimates, accuracy, convergence, stability. Linear problem applications in 1, 2 and 3 dimensions, extensions to non-linearity, non-smooth data, unsteady, spectral analysis techniques, coupled equation systems. Computer projects in heat transfer, structural mechanics, mechanical vibrations, fluid mechanics, heat/mass transport.

Cross-listed: (Same as Aerospace Engineering 517; Biomedical Engineering 517.)

Comment(s): Bachelor's degree in engineering or natural science required.

Registration Permission: Consent of instructor.

ME 522 Thermodynamics II (3)

SEC. 001 CRN 21968

TEXT: TBD

TIME: Monday & Wednesday

2:40 – 3:55

E-110

PROFESSOR: Dr. Joseph Wehrmeyer

Macroscopic thermodynamics, including First and Second Law analyses, availability, phase and chemical equilibrium criteria, combustion, gas mixtures, and property relations, determination of thermodynamic properties from molecular structure, spectroscopic data, kinetic theory, statistical mechanics, quantum physics, Schroedinger equation.

Recommended Background: Undergraduate thermodynamics.

ME 524 Fracture Mechanics (3)
SEC. 001 CRN 29648
TEXT: TBD

TIME: TBD
PROFESSOR: Dr. Reza Abedi

Mechanisms of fracture and crack growth; stress analysis; crack tip plastic zone; energy principles in fracture mechanics; fatigue-crack initiation and propagation; fracture mechanic design and fatigue life prediction. Analytical, numerical, and experimental methods for determination of stress intensity factors. Current topics in fracture mechanics.

Registration Permission: Consent of instructor.

ME 585 Turbomachinery Systems II (3)
SEC. 001 CRN 21975 (Video Recorded)
TEXT: Jack D. Mattingly; *Elements of Propulsion: Gas Turbines and Rockets*; 2006;
ISBN 1-56347-779-3
TIME: Tuesday & Thursday 4:00 – 5:15 E-111
PROFESSOR: Dr. Roy Schulz

Ideal cycle analysis of turbine engines, real cycle analysis, component performance analysis, component design and systems integration (inlets, nozzles, combustors, compressors, turbines), flowthrough theory, turbine engine component matching, transient operation, surge and rotating stall, engine control systems, structural considerations.

Comment(s): First-year graduate standing required.

Registration Permission: Consent of instructor.

ME 590 Selected Engineering Problems (2-6)
SEC. 002 CRN 21976 Abedi
003 CRN 26886 Antar
005 CRN 26887 Anusonti-Inthra
006 CRN 26888 Flandro
007 CRN 26889 Majdalani
008 CRN 26890 Moeller
009 CRN 26891 Solies
010 CRN 26892 Vakili
011 CRN 26893 Zhang

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated. Maximum 6 hours.

Comment(s): Enrollment limited to students in problems option.

Registration Permission: Consent of advisor.

ME 595 Mechanical Engineering Seminar (1)
SEC. 001 CRN 21977
TEXT: None
TIME: Will be announced through email
PROFESSOR: Dr. Ahmad Vakili

All phases of mechanical engineering, reports on current research at the University of Tennessee, Knoxville, and the University of Tennessee Space Institute.

Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 20 hours.

ME 599 Special Topics in AE: Applied Numerical Analysis for PDE (3)
SEC. 002 CRN 28619 (Same as AE 599 006 CRN 26198)
TEXT: *Finite Difference and Spectral Methods for Ordinary and Partial Differential Equations*,
Lloyd N. Trefethen, free online at <http://www.maths.ox.ac.uk/people/profiles/nick.trefethen>;
Finite Element Method: Linear Static and Dynamic Finite Element Analysis, Thomas J. R.
Hughes (Dover Publications); *Finite Volume Methods for Hyperbolic Problems*, by Randall J.
LeVeque, D. G. Crighton (Series Editor) (Cambridge Texts in Applied Mathematics)
TIME: TBD
PROFESSOR: Dr. Anusonti-Inthra

This class studies algorithms for numerically solving Partial Differential Equations with the focus in applications in the area of computational mechanics. Different types of algorithms for solving PDE will be studied; including time marching method, Finite Difference Method, Finite Volume Method, Finite Element Method. Both 1D and 2D problems will be covered. Examples of the equations to be solved are First and second order system of ODE, wave equation, Euler equation, heat equation, advection-diffusion equation, Poisson equation. Various aspects of the above numerical analysis methods will be covered including accuracy, stability, convergence. If time permits, additional topics will be included such as discretization method, adaptive method, and parallel computing. A review of linear algebra (direct, iterative solvers and eigenvalue problem) will be provided. Students are expected to be proficient in Matlab

Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor

ME 599 Special Topics in ME: Finite Volume Methods for Fluids and Plasmas (3)
SEC. 005 CRN 28700 (Same as AE 599 003 CRN 28618)
TEXT: Textbook: Lecture Notes; Supplemental Text: *Finite Volume Methods for Hyperbolic Problems*,
Randall J. LeVeque, Cambridge University Press, 2002. ISBN-10: 0521009243, ISBN-13: 978-
0521009249
TIME: Tuesday & Friday 1:00 – 2:15 E-113
PROFESSOR: Dr. Trevor Moeller

This course is designed as a modern introduction to shock-capturing finite volume methods in one and two dimensions for viscous, compressible gasdynamics and magnetohydrodynamics. Topics include: conservation and non-conservation forms of the governing equations, smooth and non-smooth solutions, waves, shocks and discontinuities, the weak form, mathematical properties of the governing equations, discretization of space, flux vector implementation and upwinding, flux-differencing and flux-vector splitting methods, the Riemann problem and Riemann solver approaches, viscous term treatment, gradient reconstruction, gradient limiting, accuracy, convergence, stability, consistency, explicit and implicit techniques, boundary conditions. Student projects using example codes provided by the instructors will constitute a large part of the coursework. Projects may be tailored to fit student research interests. Students interested in computational fluid dynamic modeling of either compressible gasdynamics and/or plasmas are encouraged to attend.

(DE) Prerequisite(s): AE 521, MA 435 or consent of instructor.
Registration Restriction(s): Minimum student level – graduate.
Registration Permission: Consent of instructor.
Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor.

ME 599 Special Topics in Mechanical Engineering: Computational Fluid Dynamics II (3)
 SEC. 006 CRN 27240 (Same as AE 599 008 CRN 27481)
 TEXT: Handouts provided by instructor
 TIME: Monday & Wednesday 11:40 – 12:55 E-110
 PROFESSOR: Dr. Greg Power

This course uses a commercial CFD code that is widely accepted and used in industries and government labs as a hands-on introduction to computational fluid dynamics. After a brief review of the fundamentals, the course will cover various aspects of the simulation process including geometry modeling, grid generation, solution strategy and post processing primarily through practical examples that bring out the importance of proper understanding of the underlying physics for the problem. Examples will also attempt to cover a wide range of problems that cover different types of flow conditions (incompressible/compressible, laminar/turbulent, steady/unsteady flows, free surface flows, flows with heat transfer and possibly reacting flows).

Repeatability: May be repeated. Maximum 6 hours.

Registration Permission: Consent of instructor.

ME 600 Doctoral Research/Dissertation (3-15)
 SEC. 015 CRN 21995 Abedi
 016 CRN 21996 Antar
 018 CRN 21998 Anusonti-Inthra
 019 CRN 21999 Flandro
 027 CRN 22007 Majdalani
 028 CRN 22008 Moeller
 029 CRN 26894 Solies
 030 CRN 26895 Vakili
 031 CRN 29631 Zhang

Grading Restriction: P/NP only.

Repeatability: May be repeated.

Registration Restriction(s): Minimum student level – graduate.

ME 621 Advanced Topics in Mechanical Systems: PhD Qualifying Exam (3)
 SEC. 002 CRN 29705
 TEXT: TBD

TIME: TBD

PROFESSOR: Dr. Matthew Mench

Advanced theory and applications in control systems, dynamics, mechanics, strength of materials and vibrations.

Repeatability: May be repeated. Maximum 9 hours.

Registration Restriction(s): Minimum student level – graduate.

Registration Permission: Consent of instructor.

PHYSICS

PHYS 500 Master's Thesis (1-15)
 SEC. 002 CRN 24168 Chen
 003 CRN 24169 Crater

004 CRN 24170 Davis
006 CRN 24172 Parigger

Grading Restriction: P/NP only.

Repeatability: May be repeated.

Credit Level Restriction: Graduate credit only.

Registration Restriction(s): Minimum student level – graduate.

PHYS 503 Physics Colloquium (1)
SEC. 002 CRN 24176
TEXT: None
TIME: 2nd & 4th Thursday 3:30 – 5:00 H-111
PROFESSOR: Dr. Horace Crater

Lectures and discussion on current research topics. Continuous registration required for current graduate students.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated. Maximum 6 hours.

*PHYS 514 Problems in Theoretical Physics II (3) **CANCELLED**
SEC. 002 CRN 28682
TEXT: TBD
TIME: Wednesday 10:15 – 11:30 E-113
PROFESSOR: Dr. M. Breinig

Fundamentals of physics: electrodynamics, relativity, and quantum mechanics.

PHYS 522 Quantum Mechanics (3)
SEC. 002 CRN 26896
TEXT: http://www.amazon.com/Modern-Quantum-Mechanics-2nd-Sakurai/dp/0805382917/ref=cm_cr_pr_product_top#
TIME: Monday & Thursday 10:30 – 11:45 E-111
PROFESSOR: Dr. Lloyd Davis

Fundamental principles of quantum mechanics, angular momentum, electron spin, particles in electric and magnetic fields, perturbation theory, variational methods, scattering theory; second quantization, quantization of electromagnetic field, emission, absorption, and scattering of light, bremsstrahlung, pair creation and annihilation. Application of quantum mechanics to problems of atomic, molecular, nuclear, and solid state physics.

(DE) Prerequisite(s): 521.

PHYS 551 Statistical Mechanics (3)
SEC. 001 CRN 29646
TEXT: (1) Franz Schwabl, *Statistical Mechanics*; <http://www.amazon.com/Statistical-Mechanics-Advanced-Texts-Physics/dp/3540323430>; Springer; 2nd Edition; ISBN 3540323430 (2) Walter Greiner, *Thermodynamics and Statistical Mechanics*; <http://www.amazon.com/Thermodynamics-Statistical-Mechanics-Classical-Theoretical/dp/0387942998>; Springer; 1st Edition; ISBN 0387942998
TIME: Monday and Thursday 1:00 – 2:20 E-111
PROFESSOR: Dr. Christian Parigger

Ergodic theory, classical ensemble theory, quantum mechanical ensembles, relation of statistical mechanics to thermodynamics, transport theory and approach to equilibrium, phase transition,

fluctuations and correlations.
(RE) Prerequisite(s): 521, 531, and 571.

PHYS 561 The Theory of Relativity (3)
SEC. 001 CRN 29704
TEXT: *General Relativity*; Dirac. *Gravitation and Cosmology*; Weinberg
TIME: Monday and Thursday 10:45 – 2:00 E-113
PROFESSOR: Dr. Horace Crater

Geometry of space-time, relativistic electrodynamics, particle mechanics and continuum mechanics, Einstein's field equations, Schwarzschild solutions, the classical test of general relativity.
(DE) Prerequisite(s): 531 and 541.

PHYS 593 Independent Study (3)
SEC. 002 CRN 29647
TEXT: TBD
TIME: TBD
PROFESSOR: Dr. Christian Parigger

Independent theoretical and experimental study: Current Physics topics of interest.
Repeatability: May be repeated. Maximum 15 hours.

PHYS 594 Special Problems (3)
SEC. 002 CRN 28977
TEXT: TBD
TIME: TBD
PROFESSOR: Dr. Lloyd Davis

Especially assigned theoretical or experimental work on problems not covered in other courses.
Repeatability: May be repeated. Maximum 9 hours.

PHYS 599 Seminars (1)
SEC. 007 CRN 24194
TEXT: None
TIME: 2nd & 4th Thursday 3:30 – 5:00 H-111
PROFESSOR: Dr. Horace Crater

(a) Mechanics; (b) Radiation; (c) Heat and Thermodynamics; (d) Electricity and Magnetism; (e) Modern Physics.
Repeatability: May be repeated with consent of department. Maximum 18 hours.

PHYS 600 Doctoral Research/Dissertation (3-15)
SEC. 002 CRN 24197 Chen
003 CRN 24198 Crater
004 CRN 24199 Davis
005 CRN 24200 Parigger

Grading Restriction: P/NP only.
Repeatability: May be repeated.
Registration Restriction(s): Minimum student level – graduate.

*PHYS 606 Nonlinear Optics **CANCELLED**

SEC. 001 CRN 27344

TEXT: <http://www.amazon.com/Nonlinear-Optics-Third-Edition-Robert/dp/0123694701>

TIME: Tuesday and Thursday 8:40 – 9:55 E-111

PROFESSOR: Dr. Lloyd Davis

Nonlinear optical susceptibilities, wave propagation in nonlinear media, sum-frequency and difference frequency generation, harmonic generation, parametric amplification and oscillation, stimulated Raman processes, two- and multi-photon processes, four-wave mixing and phase conjugation, transient coherent optical effects and free induction decay, optical breakdown and nonlinear effects in plasmas.

(DE) Prerequisite(s): 522.

Registration Restriction(s): Minimum student level – graduate.