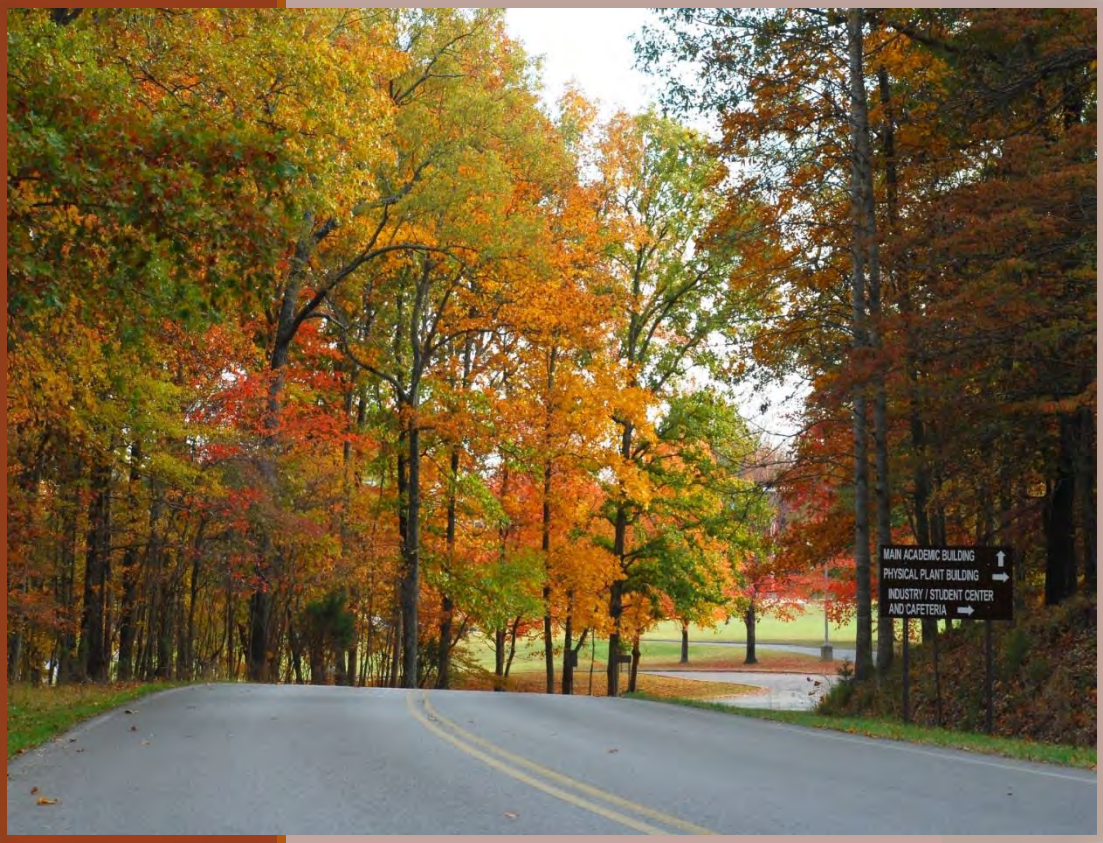
Fall 2014 Registration Announcement



The University of Tennessee

Space Institute

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Tullahoma, TN 37388-9700

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TABLE OF CONTENTS

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CALENDAR --- FALL SEMESTER 2014

Priority Registration ..... March 10, 2014 – August 18, 2014
Fall 2013 Graduation Application Deadline (submit online at myutk) ..... August 8, 2014
Admission to Candidacy Forms due for Fall 2014 Commencement ..... August 8, 2014
Late Registration and late fees begin ..... August 20 – 29, 2014
Classes begin ..... August 20, 2014
Last Day to final register, add, change grading options or drop without a "W" ..... August 29, 2014
Labor Day Holiday ..... September 1, 2014
Last day to meet with consultant for Thesis/Dissertation Preliminary Review ..... October 10, 2014
Fall Break (No Classes) ..... October 16– 17, 2014
Last day to schedule final exam (non-thesis/thesis/dissertation) ..... October 31, 2014
Register to attend the Graduate Hooding Ceremony ..... November 7, 2014
http://gradschool.utk.edu/hooding/hoodinginfo.shtml
Last day to take final exam (non-thesis/thesis/dissertation students) ..... November 7 2014
Last day to drop with a "W" ..... November 11, 2014
Thesis/Dissertation Deadline 5:00 p.m. EST ..... November 21, 2014
Report of non-thesis/thesis/dissertation defense (Pass/Fail Form) ..... November 21, 2014
Thanksgiving Holiday ..... November 27 – 28, 2014
Deadline for submission of Admission to Candidacy for students graduating Spring 2015 ..... December 2, 2014
All "INCOMPLETES" must be removed for Graduation ..... December 2, 2014
Classes End ..... December 2, 2014
Total withdrawal from the University Deadline ..... December 2, 2014
Study Period ..... December 3, 2014
Exam Period ..... December 4, 5, & 8, 2014
Graduate Hooding Ceremony (UTK) ..... December 12, 2014
COMMENCEMENT (UTK) ..... December 13, 2014
Official Graduation Date ..... December 13, 2014
Second thesis/dissertation deadlines
Defense Completed by December 2, 2014
Second Deadline Application Submitted by December 2, 2014
http://gradschool.utk.edu/forms/Second%20Deadline%20Graduation%20Application.pdf
and submit a new graduation application for Spring graduation
Thesis/Dissertation Submission Deadline by January 6, 2015
(Student will receive diploma Spring 2015 semester, but will not be required to register for thesis/dissertation credits)

SPRING SEMESTER 2015

Priority Registration for Spring Semester 2015 ..... TBD
Final Registration ..... TBD
Classes begin ..... January 7 2015
Martin Luther King Day (Holiday) ..... January 19, 2015
Spring Recess ..... April 3, 2015
Spring Break ..... March 16 – 20, 2015
Classes End ..... April 24, 2015
Study Period ..... April 27, 2015
Exam Period ..... April 28, 29, 30, 2015
Graduate Hooding Ceremony (UTK) ..... May 7, 2015
University College Commencement Ceremonies (UTK) ..... May 6 - 9 2015
Official Graduation Date ..... May 9, 2015

Dates may be revised without notice. Please refer to the following sites for updates:
http://gradschool.utk.edu/ddategraduation.shtml
http://registrar.tennessee.edu/academic_calendar/index.shtml

FALL SEMESTER 2014
FINAL STUDY DAY AND EXAM SCHEDULE

LAST DAY OF CLASSES ..... December 2, 2014

STUDY DAY ..... December 3, 2014

FINAL EXAMS - - - December 4, 5, & 8, 2014

REGULAR CLASS TIME	(Same Classroom)	EXAM TIME
1st Day - Thursday, December 4, 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 - Friday, December 5, 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 - Monday, December 8, 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
FALL 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 Assistantship/Fellowship applications can be sent to the UTSI Admissions Office, MS-1, Tullahoma, TN 37388-9700 or submitted electronically to Dee Merriman at dmerrima@utsi.edu or Clara Ferguson at cferguso@utsi.edu . All applications should be accompanied by Undergraduate and Graduate transcripts, GRE scores, and 3 letters of recommendation. International students must provide TOEFL scores in addition to the other requested documents. Copies of documents will suffice when submitting your admission application but all official transcripts and test scores should be sent to College Code 1843. A full admission cannot 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 semester 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 Fall Semester 2014 must remove all INCOMPLETE GRADES by **December 2, 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 2014-2015 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 – December 3, 2014
FINAL EXAMS – December 4, 5, & 8, 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/files/HT2011revised.pdf .

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
Fall 2014 Course Listings

AEROSPACE ENGINEERING

AE 500 Master's Thesis (1-15)
SEC. 001 CRN 42914 Abedi
009 CRN 42930 Antar
010 CRN 42934 Anusonti-Inthra
011 CRN 42936 Flandro
012 CRN 42939 Majdalani
013 CRN 42940 Moeller
014 CRN 42941 Solies
015 CRN 42944 Vakili
021 CRN 42954 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 42959 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 511 Inviscid Flow (3) **CANCELLED**
SEC. 002 CRN 46934
TEXT: TBD
TIME: Tuesday & Thursday 2:40 – 3:55 E-110
PROF: Dr. Phuriwat Anusonti-Inthra

Kinematics and dynamics of inviscid fluids; potential flow about body, conformal mapping.
(DE) Prerequisite(s): 541 and Mathematics 425.

AE 515 Air Vehicle Aerodynamics and Performance (3)
SEC. 001 CRN 45848 (Video Recorded)
TEXT: M. Asselin; *An Introduction to Aircraft Performance*; AIAA Education Series, Reston, VA 1997; ISBN 1-75-623241-X
TIME: Tuesday & Friday 1:00 – 2:15 E-111
PROF: Dr. Peter Solies

Application of aerodynamics principles to air vehicles to provide estimates of performance, stability, and control characteristics for subsonic to hypersonic speeds. Relations among thrust, drag, lift and attitude, propulsion systems, vehicle performance characteristics, and trajectory optimization.

AE 521 Aerodynamics of Compressible Fluids (3)
SEC. 001 CRN 46701
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: Monday & Wednesday 10:10 – 11:25 E-110
PROF: Dr. Trevor Moeller

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

*AE 533 Dynamics (3) **CANCELLED**
SEC. 002 CRN 48188
TEXT: TBD
TIME: Monday & Wednesday 1:10 – 2:25 E-110
PROF: Dr. Xiaopeng Zhao

Kinematics and dynamics of particles in three dimensions. Rotating coordinate systems. Hamilton's principle. Lagrange's equations of motion. Kinematics and dynamics of rigid bodies.
Cross-listed: (Same as Mechanical Engineering 533.)
Recommended Background: 391 or Mathematics 431 and an undergraduate vibrations course.

AE 541 Fluid Mechanics I (3)
SEC. 001 CRN 45850
TEXT: Fundamentals of Fluid Mechanics; 6th or 7th Edition (nearly identical); Munson et al.; John Wiley and Sons; ISBN 978-1-118-11613-5
TIME: Monday & Thursday 1:00 – 2:15 E-210
PROF: Dr. Steve Brooks

Derivation of equations governing flow of inviscid and viscous fluids (conservation of mass, Newton's second law, conservation of energy). Equations of state and constitutive relations. Euler and Navier-Stokes forms and nondimensionalization. Exact solutions and introduction to potential and boundary-layer flows.
Cross-listed: (Same as Aerospace Engineering 541; Biomedical Engineering 541.)
Recommended Background: A fluid mechanics course.

AE 557 Aerospace Vehicle Flutter and Vibration (3)
SEC. 001 CRN 49001 (Video Recorded)
TEXT: *Aircraft Vibration and Flutter*; Scanlan, R.H. and Rosenbaum, R.; Dover Publications, New York, NY; 1968
TIME: Wednesday 1:00 – 3:30 E-111
PROF: Dr. Peter Solies

Aeroelastic phenomena. Structural and aerodynamic operators. Stability criteria for airfoils operating in oscillating stream. Two- and three-dimensional flutter of wings, control surfaces and empennages.
(DE) Prerequisite(s): 551.

AE 569 Plasma Dynamics (3) (Video Recorded)
SEC. 001 CRN 50384
TEXT: Fundamentals of Plasma Dynamics, E.H. Holt and R.E. Haskell, (used versions are available via Amazon); Supplemental texts may also be used.
TIME: Tuesday & Friday 1:00 – 2:15 E-113
PROF: Dr. Trevor Moeller

Fundamental concepts of plasma including electromagnetic theory, collision processes, kinetic theory, microscopic and macroscopic descriptions, transport properties, and magnetohydrodynamic analysis.
Recommended Background: Vector calculus and graduate fluid mechanics.
Registration Permission: Consent of Instructor.

AE 590 Selected Engineering Problems (2-6)
SEC. 002 CRN 42967 Abedi
003 CRN 42968 Antar
004 CRN 46703 Anusonti-Inthra
005 CRN 46704 Flandro
006 CRN 46705 Majdalani
007 CRN 46706 Moeller
008 CRN 46707 Solies
009 CRN 46708 Vakili
010 CRN 49002 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 42971
TEXT: None
TIME: Will be announced through email
PROF: 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 Aerospace Engineering: Computational Fluid Dynamics (3) **CANCELLED**
SEC. 001 CRN 42974 (Same as ME 599 001 CRN 43671)
TEXT: Handouts provided by instructor
TIME: Monday & Wednesday 11:40 – 12:55 E-110
PROF: 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.

AE 599 Special Topics in AE: Micro/Nano Electro Mechanical Systems (3)
SEC. 002 CRN 42975 (Same as ME 599 008 CRN 48236)
TEXT: Textbook: Liu, C. *Foundations of MEMS*, 2nd Edition, Pearson Education: New Jersey, 2010, ISBN 10: 0132497360, ISBN 13: 9780132497367.
Reference:
Marc J. Madou, Fundamentals of Microfabrication and Nanotechnology; 3rd Edition, CRC Press, 2011; ISBN 9780849331800.
G. Kovacs, *Micromachined Transducer Sourcebook*, McGraw-Hill, 1998.
Nadim Maluf, An Introduction to Microelectromechanical Systems Engineering, 2nd Edition, Artech House Publishers; 2004, ISBN 978-1-58053-590-8.
Sami Franssila; *Introduction to Microfabrication*, Wiley, 2010; ISBN 978-0-470-74983-8.
TIME: Tuesday & Thursday 1:10 – 2:25 E-110
PROF: Dr. Feng-Yuan Zhang

The lectures will cover fundamentals and elements of micro/nano-scale design, fabrication, integration, and systems, including lithography, deposition, etching, thin film, surface modification, bonding, and characterization. The videos/movies will be presented to introduce the state-of-the-art fabrication process and integration. Their applications to energy systems, power/propulsion devices, biomedical applications, transducers and actuators will be discussed.
Repeatability: May be repeated. Maximum 6 hours.

*AE 599 Special Topics in AE: Introduction to Fluid-Structure Interaction Simulations (3) **CANCELLED**
SEC. 006 CRN 50628 (Same as ME 599 010 CRN 49504)
TEXT: Recommended material: ANSYS Fluid-Structure Interaction Simulation Guides
TIME: Tuesday & Thursday 10:10 – 11:25 E-110
PROF: Dr. Phuriwat Anusonti-Inthra

This class will serve as an introductory class for students who are interested in performing fluid-structure interaction simulations. Different types of one-way and two-way fluid-structure interactions will be covered; including conjugate heat transfer problems, pressure-deformation interactions, and force-deformation interactions. Some background in Finite Element Method (FEM) and Computational Fluid Dynamics (CFD) will be covered.
Repeatability: May be repeated. Maximum 6 hours.

AE 600 Doctoral Research/Dissertation (3-15)
SEC. 004 CRN 42985 Abedi
005 CRN 42987 Antar
006 CRN 42989 Anusonti-Inthra
007 CRN 42991 Flandro
008 CRN 42993 Majdalani
014 CRN 42999 Moeller
015 CRN 43000 Solies
017 CRN 46943 Vakili
018 CRN 46944 Zhang

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

*AE 681 Advanced Viscous Flow Theory (3) **CANCELLED**
SEC. 001 CRN 50665
TEXT: TBD; Handouts will be provided
TIME: Monday & Wednesday 8:40 – 9:55 E-110
PROF: Dr. Ahmad Vakili

Critical review of significance to governing equations. Nature of boundary layer approximation as singular perturbation problem. Uniqueness and existence of solutions. Applications of group theory. Special problem areas of interest to students.
(DE) Prerequisite(s): 512, continuum mechanics, and Mathematics 562.
Registration Restriction(s): Minimum student level – graduate.

AE 690 Advanced Topics in Aerospace Engineering: PhD Qualifying Exam (3)
SEC. 001 CRN 43001
TEXT: TBD
TIME: TBD
PROF: 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: Discontinuous Galerkin Finite Element Methods (3)
SEC. 003 CRN 49322
TEXT: W.H. Fleming; *Functions of Several Variables*, Addison-Wesley, Reading, MA, 1964. S. C. Brenner and L. R. Scott; *The Mathematical Theory of Finite Element Methods*, Springer Verlag, 1994. R. J. Leveque; *Finite Volume Methods for Hyperbolic Problems*, Cambridge University Press, 2003.
TIME: Tuesday & Thursday 10:10 – 11:25 E-110
PROF: Dr. Reza Abedi

This course is intended to serve as a sequel to an introductory finite element method (FEM) course where conventional (continuous) FEM method is covered. The main difference of Discontinuous Galerkin (DG) methods to continuous FEMs the weak enforcement of jump conditions on the boundary of the elements. DG methods generally are more stable and perform better for dynamic problems involving shocks and other discontinuities. In this course we cover:

1. Overview of balance laws, strong and weak forms, weighted residual and weak statement of FEM formulation.
2. Brief classification of elliptic, parabolic, and hyperbolic partial differential equations (PDEs).
3. Mathematical statement of systems of conservation laws (hyperbolic systems): characteristics; solution feature such as shocks, rarefaction waves, and contact
4. Rankine-Hugoniot jump conditions for conservation laws; Exact and some approximate Riemann solution schemes.
5. Differential forms (exterior calculus) to objectively express and combine space and time quantities.
6. Finite element formulation for DG methods.

7. Computational geometry aspects of DG methods (mesh smoothing, h-, p-, and hp-adaptive operations, moving boundaries, etc.).
8. Object-oriented design and implementation of FE methods.

More than half of the class covers the mathematical and computational background needed for DG methods. In the remainder of the class (items 7 and 8) we cover FE adaptive concepts (geometry and physics) and implement new conversation law systems with Spacetime Discontinuous Finite Element method. Some sample systems that students could formulate and implement include: acoustics equation, simple advection-diffusion-reaction equations, elastodynamics, and shallow water equations.

Repeatability: May be repeated. Maximum 9 hours.
Registration Restriction(s): Minimum student level – graduate.
Registration Permission: Consent of instructor.

AVIATION SYSTEMS

AS 500 Master's Thesis (1-15)
SEC. 001 CRN 46709 Martos
004 CRN 46712 Solies

AS 502 Registration for Use of Facilities (1-15)
SEC. 001 CRN 46713 Martos
004 CRN 46716 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.

AS 503 Air Vehicles (3)
SEC. 001 CRN 47883 (Video Recorded)
TEXT: M. Asselin; *An Introduction to Aircraft Performance*; AIAA Education Series, Reston, VA, 1997; ISBN 1-75-623241-X
TIME: Tuesday & Friday 1:00 – 2:15 E-111
PROF: Dr. Peter Solies

Focuses on the study of air vehicles as they evolved to enable human flight or unmanned flight missions. In a historical review the development of aviation technology, mission requirements, and economical aspects are emphasized. Fundamentals of aerodynamic principles and their application to air vehicles will be developed to determine performance in level flight, climb, glide and maneuvering flight, as well as characteristic parameters as range and endurance. The state of the art of present air vehicles is investigated, as well as current problems in aviation and possible solutions. A technology forecast will be offered.

AS 515 Aviation Human Factors (3)
SEC. 001 CRN 50306
TEXT: TBD
TIME: Monday 10:30 – 1:00 Airport Classroom
PROF: Dr. Steven Brooks

Human factors pertinent to aviation: concept of human factors, human error, fatigue, body rhythms, performances, motivation, vision and visual illusions, communication, attitudes, training and devices, displays and controls, space and layout, anthropometry, flight deck design and evaluation, aircraft cabin design and evaluation, flying qualities evaluation, and performance measurement techniques. Applied aviation systems.

AS 522 Experimental Flight Mechanics: Fixed Wing Stability & Control (3)
SEC. 001 CRN 46718
TEXT: Ralph D. Kimberlin; *Flight Testing of Fixed Wing Aircraft*; AIAA; 1st Edition; ISBN 1-56347-564-2
TIME: Tuesday & Friday 10:30 – 11:45 Airport Classroom
PROF: Dr. Peter Solies

Fundamental theories, flight test techniques, and data collection and analyses for fixed wing aircraft stability and control. Topics: static and dynamic longitudinal stability, longitudinal maneuvering stability and control, static and dynamic lateral-directional stability, lateral control power, and departure testing. Weekly classroom academics with approximately 4-6 flight labs.
(DE) Prerequisite(s): 516 and 521.

AS 525 Introduction to Avionics I (3)
SEC. 001 CRN 50199 (Video Recorded)
TEXT: *Principles of Avionics*; 7th Edition or latest; Albert Helfrick; Avionics Communications (http://www.avionics.com); ISBN 13:9781885544278
TIME: Tuesday & Friday 9:15 – 10:30 E-113
PROF: Dr. Monty Smith

Electronic instrumentation, navigation, communication, guidance and control systems used in aviation. Primary topics to be covered in the first semester include: review of electronics, terrestrial en route radio navigation systems, terrestrial landing aids, and satellite navigation systems.

AS 550 Project in Aviation Systems (3)
SEC. 001 CRN 46719 Martos
004 CRN 46722 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 47895 Johnson

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

BME 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 002 CRN 48019 (Video Recorded)
TEXT: *Advanced Linear Algebra for Engineers with MATLAB*; Sohail A. Dianat and Eli S. Saber; CRC Press; Latest Edition; ISBN 978-1-4200-9523-4
TIME: Tuesday & Friday 9:30 – 11:00 E-113
PROF: Dr. Monty Smith

Fundamental concepts of linear algebra to problems in engineering systems: steady state and dynamic systems. Geometric and physical interpretations of relevant concepts: least square problems, LU, QR, and SVD decompositions of system matrix, eigenvalue problems, and similarity transformations in solving difference and differential equations; numerical stability aspects of various algorithms; application of linear algebra concepts in control and optimization studies; introduction to linear programming. Computer projects.

Methods of linear algebra with application to engineering problems. Systems of linear equations: matrix-vector notation, solutions to linear equations, determinants, matrix inversion. Vector spaces: spanning sets, orthogonality, matrix decompositions, linear transformations. Eigenvalues and eigenvectors: characteristic polynomials, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices. Optimization: least-squares and weighted least-squares methods.

Cross-listed: (Same as Chemical and Biomolecular Engineering 529; Civil Engineering 529, Electrical and Computer Engineering 529; Environmental Engineering 529; Industrial Engineering 529; Materials Science and Engineering 529; Mechanical Engineering 529; Nuclear Engineering 529).

Comment(s): Graduate standing or consent of instructor required.

BME 595 Biomedical Seminar (1)
SEC. 002 CRN 47484
TEXT: None
TIME: Will be announced through email
PROF: Dr. Jacqueline Johnson

All phases of biomedical engineering, reports on current research at UTK and UTSI.
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 599 Special Topics in BME: Classic Radiation Therapy (3)
SEC. 001 CRN 43018
TEXT: *The Physics of Radiation Therapy*; Faiz M. Khan; Lippincott, Williams and Wilkins; Fourth Edition; ISBN 978-0-7817-8856-4
TIME: Tuesday & Thursday 2:40 – 3:55 E-110
PROF: Dr. Jacqueline Johnson

Dose distribution and scatter analysis, dosimetric calculations, treatment planning, electron beam therapy, brachytherapy, radiation protection, quality assurance and total body irradiation.
The students will be required to read the first eight chapters of the book before the start of the course, which covers the basic physics.
Grades will be done on eRad test results (50%). Course will be done online live and without prior knowledge of which test. Homework based on class lectures will account for the other 50%.

Repeatability: May be repeated. Maximum 12 hours.
Registration Permission: Consent of instructor.

BME 599 Contemporary Optics (3)
SEC. 005 CRN 50382 (Same as Phys 507 001 CRN 50381)
TEXT: TBD
TIME: Tuesday & Thursday 9:10 – 10:25 E-111
PROF: Dr. Lloyd Davis

Topics in geometrical, physical, Fourier, and nonlinear optics and introductory laser physics. Extensive use of computer calculations and design of practical and sophisticated optical systems.

Repeatability: May be repeated. Maximum 12 hours.
Registration Permission: Consent of instructor.

BME 600 Doctoral Research/Dissertation (3-15)
SEC. 011 CRN 47485 Johnson

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

ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

ECE 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 002 CRN 48020 (Video Recorded)
TEXT: *Advanced Linear Algebra for Engineers with MATLAB*; Sohail A. Dianat and Eli S. Saber; CRC Press; Latest Edition; ISBN 978-1-4200-9523-4
TIME: Tuesday & Friday 9:30 – 11:00 E-113
PROF: Dr. Monty Smith

Fundamental concepts of linear algebra to problems in engineering systems: steady state and dynamic systems. Geometric and physical interpretations of relevant concepts: least square problems, LU, QR, and SVD decompositions of system matrix, eigenvalue problems, and similarity transformations in solving difference and differential equations; numerical stability aspects of various algorithms; application of linear algebra concepts in control and optimization studies; introduction to linear programming. Computer projects.

Methods of linear algebra with application to engineering problems. Systems of linear equations: matrix-vector notation, solutions to linear equations, determinants, matrix inversion. Vector spaces: spanning sets, orthogonality, matrix decompositions, linear transformations. Eigenvalues and eigenvectors: characteristic polynomials, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices. Optimization: least-squares and weighted least-squares methods.

Cross-listed: (Same as Chemical and Biomolecular Engineering 529; Civil Engineering 529, Environmental Engineering 529; Industrial Engineering 529; Materials Science and Engineering 529; Mechanical Engineering 529; Nuclear Engineering 529).

Comment(s): Graduate standing or consent of instructor required.

ECE 600 Doctoral Research/Dissertation (3-15)
SEC. 026 CRN 47308 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 49293 Simonton

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 43338 Simonton
002 CRN 50326 Yu
003 CRN 45907 Tolk

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 43339 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 532 Productivity and Quality Engineering (3)
SEC. 001 CRN 45909 UTSI students participating at Tullahoma
002 CRN 45910 UTSI students participating elsewhere
003 CRN 45911 UTK students participating elsewhere
TEXT: *The Principles of Scientific Management*, F. W. Taylor, (1911) 2004 ed., Kessinger Publishing Co., New York, ISBN# 0486299880; *The New Economics for Industry*, Government, Education, W. E. Deming, (2000), 2nd ed., MIT Press, Cambridge, MA, ISBN# 0262541165 *Corporate Cultures: The Rites and Rituals of Corporate Life*, T. E. Deal and A. A. Kennedy (2000), 4th ed., Perseus Books, Reading, MA, ISBN# 0738203300
TIME: Wednesday 4:00 – 6:50 E-113
PROF: Dr. James Simonton

Productivity and quality measures defined and used to analyze current competitive position of important sectors of American industry with respect to national and international competition. Study of management theorists and systems which promote or inhibit productivity or quality improvements.

EM 533 Theory and Practice of Engineering Management (3)
SEC. 001 CRN 43340 UTSI students participating at Tullahoma
002 CRN 43341 UTSI students participating elsewhere
003 CRN 43342 UTK students participating elsewhere
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: Tuesday 4:00 – 6:50 E-113
PROF: 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 537 Analytical Methods for Engineering Managers (3)
SEC. 001 CRN 45913 UTSI students participating at Tullahoma
002 CRN 45914 UTSI students participating elsewhere
003 CRN 45915 UTK students participating elsewhere
TEXT: TBD
TIME: Monday 4:00 – 6:50 E-113
PROF: Dr. Andrew Yu

Survey of management analysis and control systems through industrial engineering techniques. Qualitative and quantitative systems: methods analysis, work measurement, incentive systems, wage and salary development, production and inventory control, facility layout, linear programming, and applied operations research techniques.
Credit Restriction: No credit for student with undergraduate degrees in industrial engineering.

EM 539 Strategic Management in Technical Organizations (3)
SEC. 001 CRN 45917 UTSI students participating at Tullahoma
002 CRN 45918 UTSI students participating elsewhere
003 CRN 45919 UTK students participating elsewhere
TEXT: *Strategic Management: Concepts & Cases;* Frank Rothaermel; 1st Edition; McGraw-Hill; ISBN 10:0078112737, ISBN-13: 978-0078112737
TIME: Thursday 4:00 – 6:50 E-113
PROF: Dr. Janice Tolk

Strategic planning process and strategic management in practice; corporate vision and mission; product, market, organizational, and financial strategies; external factors; commercialization of new technologies; and competition and beyond.
(RE) Prerequisite(s): 533 and Industrial Engineering 518 or consent of instructor.

EM 600 Doctoral Research/Dissertation (3-15)
SEC. 001 CRN 45923 Simonton
002 CRN 45925 Yu
003 CRN 50433 Tolk

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

INDUSTRIAL ENGINEERING

IE 516 Statistical Methods in Industrial Engineering (3)
SEC. 003 CRN 45998
TEXT: TBD
TIME: TBD
PROF: Dr. Ming Jin

Application of classical statistical techniques to industrial engineering problems. Statistics and statistical thinking in managerial context of organizational improvement; descriptive statistics and distribution theory; relationship between statistical process control techniques and classical statistical tools; parameter estimation and hypothesis testing; goodness-of-fit testing; linear regression and correlation; analysis of variance; single and multiple factor experimental design.
Recommended Background: Statistics 251 or equivalent.

IE 526 Advanced Application of Systems Modeling and Simulation (3)
SEC. 003 CRN 46010
TEXT: *The Big Book of Simulation Modeling: Multimethod Modeling with Anylogic 6;* Andrei Borshchev, AnyLogic North America Publisher (June 2013), ISBN-10: 0989573176 or ISBN-13: 978-0989573177
TIME: TBD
PROF: Dr. Xueping Li

Modeling and simulation of business and industry systems to enhance management, strategic, and operational decision-making. Hands-on experiences of simulation software package (e.g., Arena) will be provided with case studies in manufacturing, supply chain and logistics, healthcare, etc.
Cross-listed: (Same as Management Science 526.)
Recommended Background: 306.

IE 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 002 CRN 48021 (Video Recorded)
TEXT: Advanced Linear Algebra for Engineers with MATLAB; Sohail A. Dianat and Eli S. Saber; CRC Press; Latest Edition; ISBN 978-1-4200-9523-4
TIME: Tuesday & Friday 9:30 – 11:00 E-113
PROF: Dr. Monty Smith

Fundamental concepts of linear algebra to problems in engineering systems: steady state and dynamic systems. Geometric and physical interpretations of relevant concepts: least square problems, LU, QR, and SVD decompositions of system matrix, eigenvalue problems, and similarity transformations in solving difference and differential equations; numerical stability aspects of various algorithms; application of linear algebra concepts in control and optimization studies; introduction to linear programming. Computer projects.

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characteristic polynomials, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices. Optimization: least-squares and weighted least-squares methods.

Cross-listed: (Same as Chemical and Biomolecular Engineering 529; Civil Engineering 529, Electrical and Computer Engineering 529; Environmental Engineering 529; Materials Science and Engineering 529; Mechanical Engineering 529; Nuclear Engineering 529).

Comment(s): Graduate standing or consent of instructor required.

IE 550 Graduate Seminar (1)
SEC. 003 CRN 46478
TEXT: TBD
TIME: TBD
PROF: Dr. Ming 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.

MATHEMATICS

MATH 404 Applied Vector Calculus (3)
SEC. 001 CRN 43509
TEXT: *Vector Calculus*; Paul C. Matthews; Springer; ISBN-10: 3540761802; ISBN-13: 978-3540761808
TIME: Tuesday 2:00 – 4:30 F-253
PROF: Dr. Jan Zijlstra

Topics from multivariable and vector calculus; line and surface integrals, divergence theorem and the theorems of Gauss and Stokes.
(RE) Prerequisite(s): 241 or 247.

MATH 511 Methods in Applied Mathematics I (3)
SEC. 001 CRN 47920 (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
PROF: Dr. Horace Crater

Fundamentals and techniques associated with discrete models of physical, engineering and biological systems: difference equations, networks and graphs, optimization, and other topics.
Recommended Background: Courses in advanced calculus and linear algebra.

This is a two-semester course targeted for engineering students who have taken Math 404 and 435 (vector analysis and partial differential equations) and who need additional math courses for their research or advanced courses. Math Methods (Physics 571,573(2) or Math 517-518s) is currently a two semester

course with the second (573(2)) being a numerical methods course for solutions of physical problems. Below I list the math topics together with likely applications (Topics & Applications)

Topics include: Calculus of variations & Euler Lagrange equations; Vector spaces & finite difference methods for solutions of eigenvalue equations; Tensors & elastic and viscous media; Complex variable, Fourier series and transforms & the forced and damped and coupled harmonic oscillators ; Special Functions & Classical Field Theories (Plasmas, Electrodynamics and Gravity), Perturbation theory and nonperturbative methods & scattering theory; Complex variables (conformal mapping) & fluid flow and problems in potential theory; Perturbation theory and Classical Chaos, other topics to be included depending on interests.

The physics needed will be introduced as the corresponding math topics are introduced. Focus will be on the mathematics.

MECHANICAL ENGINEERING

ME	500	Master's Thesis (1-15)	
SEC.	001	CRN 43629	Abedi
	021	CRN 43649	Antar
	022	CRN 43650	Anusonti-Inthra
	023	CRN 43651	Flandro
	024	CRN 43652	Majdalani
	025	CRN 43653	Moeller
	034	CRN 46723	Solies
	035	CRN 46724	Vakili
	036	CRN 46725	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 46726	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	511	Heat Transfer I	(Video Recorded)	
SEC.	001	CRN 46155		
TEXT:	Glen E. Myers; *Analytical Methods in Conduction Heat Transfer*; 2nd Edition; AMCHT; ISBN 1-890911-04-6; for the radiation component refer to chapters 12 and 13 - Frank P. Incropera and David P. DeWitt; *Fundamentals of Heat and Mass Transfer*; 5th Edition, Wiley; ISBN 0-471-38650-2		
TIME:	Monday & Wednesday	4:30 – 5:45	E-111	
PROF:	Dr. Roy Schulz and Dr. Paul Marotta			

Properties of radiating surfaces. Diffuse, specular and directional interchange for gray and nongray surfaces. Interaction with other heat transfer modes. Analysis of steady-state and time-dependent with other heat transfer modes. Analysis of steady-state and time-dependent heat conduction by analytical methods.
Recommended Background: Undergraduate heat transfer course.

ME 521 Thermodynamics I (3)
SEC. 002 CRN 46936
TEXT: TBD
TIME: Monday & Wednesday 2:40 – 3:55 E-110
PROF: 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 50664
TEXT: TBD
TIME: Tuesday & Thursday 11:40 – 12:55 E-110
PROF: 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 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 002 CRN 48023 (Video Recorded)
TEXT: *Advanced Linear Algebra for Engineers with MATLAB;* Sohail A. Dianat and Eli S. Saber; CRC Press; Latest Edition; ISBN 978-1-4200-9523-4
TIME: Tuesday & Friday 9:30 – 11:00 E-113
PROF: Dr. Monty Smith

Fundamental concepts of linear algebra to problems in engineering systems: steady state and dynamic systems. Geometric and physical interpretations of relevant concepts: least square problems, LU, QR, and SVD decompositions of system matrix, eigenvalue problems, and similarity transformations in solving difference and differential equations; numerical stability aspects of various algorithms; application of linear algebra concepts in control and optimization studies; introduction to linear programming. Computer projects.

Methods of linear algebra with application to engineering problems. Systems of linear equations: matrix-vector notation, solutions to linear equations, determinants, matrix inversion. Vector spaces: spanning sets, orthogonality, matrix decompositions, linear transformations. Eigenvalues and eigenvectors: characteristic polynomials, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices. Optimization: least-squares and weighted least-squares methods.

Cross-listed: (Same as Chemical and Biomolecular Engineering 529; Civil Engineering 529, Electrical and Computer Engineering 529; Environmental Engineering 529; Industrial Engineering 529; Materials Science and Engineering 529; Nuclear Engineering 529).

Comment(s): Graduate standing or consent of instructor required.

ME 533 Dynamics (3)
SEC. 002 CRN 48189
TEXT: TBD
TIME: Monday & Wednesday 1:10 – 2:25 E-110
PROF: Dr. Xiaopeng Zhao

Kinematics and dynamics of particles in three dimensions. Rotating coordinate systems. Hamilton's principle. Lagrange's equations of motion. Kinematics and dynamics of rigid bodies.
Cross-listed: (Same as Aerospace Engineering 533.)
Recommended Background: 391 or Mathematics 431 and an undergraduate vibrations course.

ME 541 Fluid Mechanics I (3)
SEC. 001 CRN 46159
TEXT: Fundamentals of Fluid Mechanics; 6th or 7th Edition (nearly identical); Munson et al.; John Wiley and Sons; ISBN 978-1-118-11613-5
TIME: Thursday 7:30 – 10:00 E-210
PROF: Dr. Steve Brooks

Derivation of equations governing flow of inviscid and viscous fluids (conservation of mass, Newton's second law, conservation of energy). Equations of state and constitutive relations. Euler and Navier-Stokes forms and nondimensionalization. Exact solutions and introduction to potential and boundary-layer flows.
Cross-listed: (Same as Aerospace Engineering 541; Biomedical Engineering 541.)
Recommended Background: A fluid mechanics course.

ME 584 Turbomachinery Systems I (3)
SEC. 001 CRN 46166 (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
PROF: Dr. Milt Davis
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 (3)
SEC. 001 CRN 43667 Abedi
002 CRN 43668 Antar
003 CRN 46172 Anusonti-Inthra
004 CRN 46727 Flandro
005 CRN 46728 Majdalani

006 CRN 46729 Moeller
007 CRN 46730 Solies
008 CRN 46731 Vakili
009 CRN 46732 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 43669
TEXT: None
TIME: Will be announced through email
PROF: 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.

*ME 599 Special Topics in Mechanical Engineering: Computational Fluid Dynamics (3) **CANCELLED**
SEC. 001 CRN 43671 (Same as AE 599 001 CRN 42974)
TEXT: Handouts provided by instructor
TIME: Monday & Wednesday 11:40 – 12:55 E-110
PROF: 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 599 Special Topics in ME: Micro/Nano Electro Mechanical Systems (3)
SEC. 008 CRN 48236 (Same as AE 599 002 CRN 42975)
TEXT: Textbook: Liu, C. *Foundations of MEMS*, 2nd Edition, Pearson Education: New Jersey, 2010, ISBN 10: 0132497360, ISBN 13: 9780132497367.
Reference:
Marc J. Madou, Fundamentals of Microfabrication and Nanotechnology; 3rd Edition, CRC Press, 2011; ISBN 9780849331800.
G. Kovacs, *Micromachined Transducer Sourcebook*, McGraw-Hill, 1998.
Nadim Maluf, An Introduction to Microelectromechanical Systems Engineering, 2nd Edition, Artech House Publishers; 2004, ISBN 978-1-58053-590-8.
Sami Franssila; *Introduction to Microfabrication*, Wiley, 2010; ISBN 978-0-470-74983-8.
TIME: Tuesday and Thursday 1:10 – 2:25 E-110
PROF: Dr. Feng-Yuan Zhang

The lectures will cover fundamentals and elements of micro/nano-scale design, fabrication, integration, and systems, including lithography, deposition, etching, thin film, surface modification, bonding, and characterization. The videos/movies will be presented to introduce the state-of-the-art fabrication process and integration. Their applications to energy systems, power/propulsion devices, biomedical applications, transducers and actuators will be discussed.
Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor.

*ME 599 Special Topics in ME: Introduction to Fluid-Structure Interaction Simulations (3) **CANCELLED**
SEC. 010 CRN 49504 (Same as AE 599 006 CRN 50628)
TEXT: Recommended material: ANSYS Fluid-Structure Interaction Simulation Guides
TIME: Tuesday & Thursday 10:10 – 11:25 E-110
PROF: Dr. Phuriwat Anusonti-Inthra

This class will serve as an introductory class for students who are interested in performing fluid-structure interaction simulations. Different types of one-way and two-way fluid-structure interactions will be covered; including conjugate heat transfer problems, pressure-deformation interactions, and force-deformation interactions. Some background in Finite Element Method (FEM) and Computational Fluid Dynamics (CFD) will be covered.
Repeatability: May be repeated. Maximum 6 hours.

ME 600 Doctoral Research/Dissertation (3-15)
SEC. 015 CRN 43688 Abedi
016 CRN 43689 Antar
018 CRN 43691 Anusonti-Inthra
019 CRN 43692 Flandro
027 CRN 43700 Majdalani
028 CRN 43701 Moeller
026 CRN 43699 Solies
029 CRN 49004 Vakili
030 CRN 49005 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. 001 CRN 46174
TEXT: TBD
TIME: TBD
PROF: 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. 004 CRN 42114 Davis
002 CRN 42030 Lewis
005 CRN 42117 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 42132
TEXT: None
TIME: TBD
PROF: TBD

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 507 Contemporary Optics (3)
SEC. 001 CRN 50381 (Same as BME 599 005 CRN 50382)
TEXT: TBD
TIME: Tuesday & Thursday 9:10 – 10:25 E-111
PROF: Dr. Lloyd Davis

Topics in geometrical, physical, Fourier, and nonlinear optics and introductory laser physics. Extensive use of computer calculations and design of practical and sophisticated optical systems.

PHYS 531 Classical Mechanics (3)
SEC. 002 CRN 42142 (Video Recorded)
TEXT: *Classical Mechanics*; Goldstein; 2nd Edition
TIME: Monday & Thursday 10:45 –12:00 E-113
PROF: Dr. Horace Crater

Variational formulation, Lagrange's and Hamilton's equations, constraints, canonical transformations, Hamilton-Jacobi theory and action-angle variables.

PHYS 599 Seminars (1)
SEC. 005 CRN 42166
TEXT: None
TIME: TBD
PROF: Dr. Lloyd Davis

(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 599 Seminars (1)
SEC. 009 CRN 50383

TEXT: None
TIME: TBD
PROF: Dr. Christian Parigger

(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. 004 CRN 42172 Davis
005 CRN 42173 Parigger

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

PHYS 605 Laser Spectroscopy (3)
SEC. 001 CRN 49007
TEXT: Classic books, on-line references, lecture and lab notes: (1) several textbooks will be used to review classical laser spectroscopy: "Laser Spectroscopy," Demtröder; "Atomic and Laser Spectroscopy," Corney; "Introduction to Nonlinear Laser Spectroscopy," Levenson; "Aux Frontieres de la Spectroscopie Laser," Les Houches, Vol. 1, 2 ed. Balian, Haroche, Liberman; "Laser Spectroscopy," ed. Brewer, Mooradian, "Physics Reports: High resolution spectroscopy with lasers," Demtröder; (2) current topics by use of on-line journals, including "Applied spectroscopy," "Journal of quantitative spectroscopy & radiative transfer," "Optics and spectroscopy," "Spectrochimica Acta Part A: Molecular Spectroscopy," "Spectrochimica acta. Part A (Molecular and biomolecular spectroscopy) and B (Atomic spectroscopy);" "Journal of Physics B, Atomic, molecular and optical physics," "Review of Modern Physics," e.g. "Laser Spectroscopy and Quantum Optics," Hänsch and Walther, OSA publications, and PROLA (Physical Review Online Archive) http://prola.aps.org; (3) selected lecture notes and laboratory notes.
TIME: Monday & Thursday 1:00 – 2:15 E-111
PROF: Dr. Christian Parigger

Applications of lasers to spectroscopy of atomic and molecular systems; absorption, laser-induced fluorescence, and Raman spectroscopy; molecular and atomic coherence, quantum beats, resonance fluorescence, photon echoes, self-induced transparency; saturation and Doppler-free spectroscopy; laser cooling and trapping.
(DE) Prerequisite(s): 521 and 541.
Registration Restriction(s): Minimum student level – graduate