

Spring 2016 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



TABLE OF CONTENTS

Calendar Spring Semester 2016.....	1
Final Study Day and Exam Schedule.....	2
Registration Procedure.....	3
Toll-Free Numbers.....	3
Application for Admission.....	3
Total Withdrawal from the University.....	4
Grades	4
Graduate Student Change of Registration after the Deadline	4
Full-Time Students.....	4
Removal of “Incomplete” Grade	4
Repeating a Course	5
Admission to Candidacy (MS and PhD).....	5
Continuous Enrollment	5
Consequences of Non-Enrollment without Leave of Absence	5
Final Exam for Non-Thesis/Thesis/Dissertation.....	6
UT Policy on Insurance for International Students.....	6
General Seminar	6
Final Exam Dates.....	6
Financial Calendar, Fees, Refunds and Tuition	6
Honor Statement	7
The University of Tennessee Policy on a Drug-Free Campus and Workplace.....	7
Spring Semester 2016 Course Listings & Descriptions.....	8

CALENDAR - 2016 SPRING SEMESTER

Priority Registration.....	October 12, 2015
Admission to Candidacy Forms for Spring 2016 Commencement	November 2, 2015
Spring 2016 Graduation Application Deadline (submit online)	November 2, 2015
Graduation Fee Payment Deadline (MS \$30, PhD \$75).....	November 2, 2015
Payment Due for Priority Registration.....	January 11, 2016
Late Registration and late fees begin (\$100 Late Fee).....	January 13, 2016
Classes begin.....	January 13, 2016
Martin Luther King Holiday	January 18, 2016
Last Day to final register, add, change grading options or drop without a "W".....	January 22, 2016
Late Registration and late fees after 14 th day (\$200)	January 27, 2016
Preliminary Thesis/Dissertation Review Deadline	February 26, 2016
Register to attend the Graduate Hooding Ceremony (http://gradschool.utk.edu).....	TBD
Purchase cap and gown and order hood (865-974-3459).....	TBD
Spring Break (No Classes).....	March 14 - 18, 2016
Spring Recess (No Classes)	March 25, 2016
Last day to schedule final exam (non-thesis/thesis/dissertation)	March 31, 2016
Drop with a "W"	April 5, 2016
Last day to take final exam (non-thesis/thesis/dissertation)	April 7, 2016
All "INCOMPLETE" must be removed for Graduation.....	April 15, 2016
Thesis/Dissertation Deadline 5:00 p.m. EST	April 21, 2016
Submit report of final examination (Pass/Fail) form	April 21, 2016
Deadline for Submission of Admission to Candidacy for students Graduating Summer 2015 and Graduation Application.....	TBD
Classes End.....	April 29, 2016
Total Withdraw from the University Deadline	April 29, 2016
Study Period.....	May 2, 2016
Exam Period.....	May 3, 4, & 5, 2016
Graduate Hooding Ceremony (UTK)	May 12, 2016
COMMENCEMENT (UTK)	May 11 - 14, 2016
Official Graduation Date.....	May 14, 2016

Second thesis/dissertation deadlines

Defense Completed by April 29, 2016

Second Deadline Application Submitted by April 29, 2016

<http://gradschool.utk.edu/forms/Second%20Deadline%20Graduation%20Application.pdf>

Thesis/Dissertation Submission Deadline by May 19, 2016

(Student will receive diploma summer 2016 semester, but will not be required to register for thesis/dissertation credits)

SUMMER SEMESTER 2016

Priority Registration.....	TBD
Final Registration	TBD
Memorial Day Holiday	May 30, 2016
Classes begin.....	June 2, 2016
July 4 th Holiday	July 4, 2016
Classes End.....	August 9, 2016
Summer Graduation Date on Transcript (No Ceremony).....	August 12, 2016

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

**SPRING SEMESTER 2016
FINAL STUDY DAY AND EXAM SCHEDULE**

LAST DAY OF CLASSES.....April 29, 2016

STUDY PERIODMay 2, 2016

FINAL EXAMS

REGULAR CLASS TIME	(Same Classroom)	EXAM TIME
--------------------	------------------	-----------

1st Day – Tuesday, May 3, 2016

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 May 4, 2016

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 5, 2016

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 2016

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 A-206, 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 <https://www.applyweb.com/utg> 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 test

scores and 3 letters of recommendation when applying. International applicants will also need to include TOEFL scores. Please select UT Space Institute if your plans are to attend the Tullahoma campus location. Only online applications will be accepted by Graduate Admissions Knoxville, TN.

Graduate Research Assistantship applications can be sent to the Director of Admissions, University of Tennessee Space Institute, MS-1, Tullahoma, TN 37388-9700. All applications should be accompanied by undergraduate and graduate transcripts and GRE test scores are required for all departments. All International applicants will need to provide TOEFL test scores in addition to GRE's. All official transcripts and test scores should be sent to College Code 1843, Graduate Admissions Office, 201 Student Services Building, Knoxville, TN 37996-0221. A full admission will not be granted by Graduate Admissions until all official test scores and degree confirmation are received. Please contact Dee Merriman, Director of Admissions, at (931) 393-7213 or 888-822-8874 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 A-206, (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 Fall Semester 2015 must remove all INCOMPLETE GRADES by **April 15, 2016**. 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 ENROLLMENT

All degree-seeking graduate students are expected to make a full commitment to their graduate and professional study in order to ensure that they can complete all degree requirements without unnecessary delay. Graduate students are therefore required to maintain an active status through continuous enrollment from the time of first enrollment until graduation.

Continuous enrollment is maintained by registering for a minimum of one graduate credit hour per semester (excluding the summer, unless stipulated otherwise by the program or department). However, students who have started taking dissertation hours (course 600) must maintain a minimum of three credit hours per semester during all semesters, including the summer, as stipulated in the policy on "Registration for Course 600 (Doctoral Research and Dissertation)" in order to comply with the Continuous Enrollment requirement (see under Doctoral Programs for details).

The minimum enrollment for international students may be different, and international students always need to check with the Center for International Education (CIE) in order to determine what minimum enrollment they need to maintain in order to satisfy all enrollment requirements attached to their specific visa.

CONSEQUENCES OF NON-ENROLLMENT WITHOUT LEAVE OF ABSENCE

Graduate students who do not maintain continuous enrollment as stipulated in the "Continuous Enrollment" policy will lose their active student status. A student who has lost his or her active status without having been granted a Leave of Absence for the period of non-enrollment ahead of

time will not be allowed to continue in his her graduate program until readmitted. (see policy on "Readmission" in the Graduate Catalog for more details).

Non-enrollment other than during an approved Leave of Absence (LOA) does not alter or affect any of the milestone deadlines, such as admission to candidacy, time to degree, etc.

Upon approval for readmission to complete the interrupted degree program, students will be retroactively enrolled in every semester of missed enrollment for one graduate credit hour of Course 502 or for three graduate credit hours of Course 600 (whichever is appropriate). Students will be responsible for paying the past tuition charges and fees as well as the current university per semester late registration penalty. All past due charges will need to be paid before the Graduate School will approve the student for any future enrollment.

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 (room C-106 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 – May 2, 2016

FINAL EXAMS –May 3, 4, & 5, 2016

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.

The UTSI Budget and Finance Accounts Receivable Office will no longer accept payment for tuition and fees by credit card starting Spring 2015. All students will need to login to MyUTK One Stop to make secure payments online.

Please see One Stop - Paying Tuition and Fees webpage for more details <http://onestop.utk.edu/pay/>.

Credit or Debit Cards

There is a 2.75% service fee for these payments. UT has a contract with an outside vendor to provide this service. The vendor retains the fee in full.

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 1988 (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 2016 Course Listings**

AEROSPACE ENGINEERING

AE	500	Master's Thesis (1-15)	
SEC.	009	CRN 24405	Abedi
	011	CRN 24406	Anusonti-Inthra
	012	CRN 24407	Majdalani
	013	CRN 24408	Moeller
	014	CRN 24409	Schmisseur
	015	CRN 24410	Solies
	016	CRN 24411	Vakili
	021	CRN 24416	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 24418	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 24419	
TEXT:	TBD		
TIME:	Tuesday & Thursday	10:10 – 11:25	E-110
PROF:	Dr. Steve Brooks		

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. 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: Consent of instructor.

AE 513 Experimental Methods in Fluid Mechanics (3)
 SEC. 001 CRN 31466
 TEXT: J.R. Goldstein; *Fluid Mechanics Measurements*; 2nd Edition; Taylor and Francis
 ISBN 1-56032-306-X
 TIME: Monday & Thursday 10:00 – 11:15 E-211
 PROF: Dr. Ahmad Vakili

Experimental techniques with laboratory experiments; representative experiments: hot wire anemometry and turbulence measurements, flow visualization, wind tunnel tests, water table experiments, supersonic flow experiments, boundary layer measurements, laser-optical measurements.

(DE) Prerequisite(s): 541.

AE 517 Finite Elements for Engineering Applications (3)
 SEC. 001 CRN 28514 (Same as ME 517 001 CRN 28483)
 TEXT: K. J. Bathe; *Finite Element Procedures*. Cambridge, MA: Klaus-Jurgen Bathe, 2007.
 ISBN: 9780979004902
 T. J. R. Hughes; *The Finite Element Method: Linear Static and Dynamic Finite Element Analysis*, Dover Publications, 2000. ISBN: 978-0486411811
 TIME: Tuesday & Thursday 1:10 – 2:25 E-110
 PROF: 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 Mechanical 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 26081
 TEXT: John D. Anderson; *Modern Compressible Flow: With Historical Perspectives*; 3rd Edition;
 McGraw Hill; ISBN 0-07-242443-5.
 TIME: Monday & Wednesday 10:10 – 11:25 E-110
 PROF: Dr. John Schmisser

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 24424 Abedi
 003 CRN 24425 Anusonti-Inthra
 004 CRN 26084 Majdalani
 005 CRN 26085 Moeller

006 CRN 26086 Schmisser
 007 CRN 26087 Solies
 008 CRN 26088 Vakili
 009 CRN 26089 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 24426
 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 AE: Space Environment Effects (3)
 SEC. 001 CRN 24428 (Same as ME 599 002 CRN 27677)
 TEXT: Vincent L. Piscane, *The Space Environment and Its Effects on Space Systems*, AIAA Education Series, 2008.
 Supplemental text: Daniel Hastings and Henry Garrett, *Spacecraft-Environment Interactions*, Cambridge University Press, 1996.
 Various other sources provided by instructor
 TIME: Tuesday and Friday 1:00 – 2:15 E-113
 PROF: Dr. Trevor Moeller

This is an introductory course on the effects of the space environment on space systems. The primary focus will be on the space environment in which satellites and spacecraft are in earth orbit. This environment contains many hazards, including: photons, particle radiation, meteoroids, high-energy atoms, molecules, and ions, extreme temperature ranges, and orbital debris. This course will be split into two parts: 1) the space environment and 2) the interactions of the space environment with spacecraft.

Consent of instructor must be obtained to register.
Repeatability: May be repeated. Maximum 6 hours.

AE 599 Special Topics in AE: Computer Methods in Dynamics of Continua (3)
 SEC. 003 CRN 27676 (Same as ME 599 013 CRN 28918)
 TEXT: Thomas J.R. Hughes; *The Finite Element Method: Linear Static and Dynamic Finite Element Analysis*; Dover Civil and Mechanical Engineering, 2000
 ISBN 978-0486411811. Recommended text only, not required.
 TIME: Monday & Wednesday 11:40 – 12:55 E-110
 PROF: Dr. Reza Abedi

This course is intended to serve as a sequel to an introductory finite element or computational mechanics courses. It is designed to deepen student's understanding of the characteristics of elliptic, parabolic, and hyperbolic partial differential equations (PDE) and get familiar with solution techniques for dynamic problems.

Prerequisite: ME 517

AE 599 Special Topics in AE: Aircraft Flight Controls (Same as AVSY 516 001 CRN 24502) (3)
SEC. 005 CRN 25927
TEXT: Nelson, Robert C; *Flight Stability and Automatic Control*; 2nd Edition 1988 or later; McGraw-Hill, NY; ISBN 0-07-046273-9
TIME: Tuesday & Friday 1:00 – 2:15 E-111
PROF: 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.

Repeatability: May be repeated. Maximum 6 hours.

AE 599 Special Topics in AE: Computational Fluid Dynamics II (3) **CANCELLED**
SEC. 008 CRN 26861 (Same as ME 599 006 CRN 26637)
TEXT: No required text
TIME: Monday & Wednesday 11:40 – 12:55 E-110
PROF: 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. A personal computer with at least a 64-bit processor and 4 – 8 GB of RAM is required for this course.

Repeatability: May be repeated. Maximum 6 hours.

AE 599 Aircraft Design (Same as AVSY 506 001 CRN 24499) (3)
SEC. 013 CRN 30275 (Not 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: TBD
PROF: 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 Experimental Flight Mechanics: Fixed Wing Performance (3)
 SEC. 014 CRN 30277 (Same as AVSY 521 001 CRN 24503)
 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
 PROF: Dr. Peter Solies

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.

Repeatability: May be repeated. Maximum 6 hours.

AE 600 Doctoral Research/Dissertation (3-15)
 SEC. 006 CRN 24435 Abedi
 007 CRN 24436 Anusonti-Inthra
 008 CRN 24437 Majdalani
 009 CRN 24438 Moeller
 010 CRN 24439 Schmisser
 013 CRN 24442 Solies
 015 CRN 26090 Vakili
 017 CRN 24444 Zhang

Grading Restriction: P/NP only.

Repeatability: May be repeated.

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

AE 601 Doctoral Research Methodology (3)
 SEC. 002 CRN 30112
 TEXT: TBD
 TIME: TBD
 PROF: Dr. Kivanc Ekici

Methods of planning and conducting original research and proposal writing.

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

Registration Permission: Departmental approval.

AE 682 Rocket Propulsion II (3) **CANCELLED**
 SEC. 001 CRN 30953
 TEXT: George P. Sutton and Oscar Biblarz, *Rocket Propulsion Elements*, 3rd or 4th ed. Wiley.
http://www.amazon.com/Rocket-Propulsion-Elements-George-Sutton/dp/0470080248/ref=sr_1_1?ie=UTF8&qid=1437680444&sr=8-1&keywords=sutton+rocket+propulsion+elements
 TIME: Monday & Thursday 10:00 – 11:15 E-113
 PROF: Dr. Trevor Moeller

Solid propellant rocket performance, homogeneous and heterogeneous propellant chemistry and combustion system performance, thermal decomposition and gas phase reaction models; effect of chamber pressure and additives on solid propellant burn rates, erosive burning; analysis of two-phase

solid rocket exhaust flow. Introduction to nuclear and electric propulsion; electrical resistance and electric field (ion) engine performance, magnetohydrodynamic thrusters, traveling wave thrusters; exotic propulsion systems.

(RE) Prerequisite(s): 581.

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

Registration Permission: Consent of Instructor.

AVIATION SYSTEMS

AVSY 500 Master's Thesis (1-15)
SEC. 001 CRN 24491 Brooks
003 CRN 24492 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 24495 Brooks
003 CRN 24496 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 599 013 CRN 30275) (3)
SEC. 001 CRN 24499 (Not 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: TBD
PROF: 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.

AVSYS 515 Human Factors in Aviation (3)
SEC. 001 CRN 31408
TEXT: TBD
TIME: TBD
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.

AVSY 516 Aircraft Flight Controls (Same as AE 599 005 CRN 25927) (3)
SEC. 001 CRN 24502
TEXT: Nelson, Robert C; *Flight Stability and Automatic Control*; 2nd Edition 1988 or later; McGraw-Hill, NY; ISBN 0-07-046273-9
TIME: Tuesday & Friday 1:00 – 2:15 E-111
PROF: 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 24503 (Same as AE 599 014 CRN 30277)
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
PROF: Dr. Peter Solies

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 550 Project in Aviation Systems (3)
SEC. 001 CRN 24504 Brooks
003 CRN 24505 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 26719 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. 001 CRN 24532 (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 – 10:45 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 578 Advanced Biomaterials: Biological Applications of Nanomaterials (3)
SEC. 002 CRN 30299 (Same as MSE 578 002 CRN 30300)
TEXT: *Nanomaterials*; Dieter Vollath; Wiley; Second; ISBN: 978-3-527-33379-0
TIME: Monday & Wednesday 1:10 – 2:25 E-110
PROF: Dr. Jackie Johnson

Focuses on the biological/medical uses of nanoscale materials. Includes the following topics: 0-d, 1-d, and 2-d nanomaterials synthesis and characterization with an emphasis on surface properties. Chemical and biological functionalization of nanomaterials and nano-bio interfaces. Biological and biomedical application of nanomaterials. The state-of-the-art research papers will be reviewed and discussed. *Cross-listed: (Same as Material Science Engineering 578.)*
Recommended Background: 474.
Comment(s): Prior knowledge may satisfy prerequisites, with consent of instructor.

BME 587 Dynamic Modeling and Simulation (3)
SEC. 002 CRN 28920 (Same as ME 587 002 CRN 28919)
TEXT: TBD
TIME: Tuesday & Thursday 2:40 – 3:55 E-110
PROF: Dr. Gary V. Smith

Modeling and analysis of physical systems. Systems and parameter identification. Mathematical modeling methods and approximations. Digital simulation techniques and practices. Design and control applications. *Cross-listed: (Same as Mechanical Engineering 587.)*
Recommended Background: 363.

BME 590 Selected Biomedical Engineering Problems (2-6)
SEC. 001 CRN 27788 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 26888
TEXT: None
TIME: Will be announced through email
PROF: 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 26720 Johnson

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

BME 601 Doctoral Research Methodology (3)
SEC. 002 CRN 30113
TEXT: TBD
TIME: TBD
PROF: Dr. Eric Boder

Intensive, individualized experience in reviewing literature, evaluating experimental or theoretical methods, planning a research project, and presenting research project plans orally and in writing.
Registration Restriction(s): Minimum student level – graduate. PhD students only.
Registration Permission: Consent of instructor.

ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

ECE 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 001 CRN 30085 (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 – 10:40 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. 031 CRN 29960 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 28484 Simonton
003 CRN 29962 Yu

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 22221 Simonton
003 CRN 29963 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 22222 Simonton
002 CRN 31001 Yu

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 22223 Students participating at Tullahoma classrooms
002 CRN 22224 Students participating by distance ed.
003 CRN 22225 Students participating at Knoxville DE classrooms
TEXT: TBD
TIME: Wednesday 4:00 – 6:35 E-113
PROF: Dr. David Dietrich

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)
SEC. 001 CRN 22227 Students participating at Tullahoma classrooms
002 CRN 22228 Students participating by distance ed.
003 CRN 22229 Students participating at Knoxville DE classrooms
TEXT: *Introduction to Management Accounting*, 15th Edition, C. T. Horngren, G. L. Sundem, W. Stratton, D. Burgstahler, J. Schatzberg, ISBN-13: 978-0-13-610265-6
TIME: Tuesday 4:00 – 6:35 E-113
PROF: 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 28493 Students participating at Tullahoma classrooms
002 CRN 28494 Students participating by distance ed.
003 CRN 28495 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: Thursday 4:00 – 6:35 E-113
PROF: 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.

Recommended Background: Graduate standing in Engineering or Business.

EM 541 Managing Change and Improvement in Technical Organizations (3)
SEC. 001 CRN 22231 (Pre-recorded)
TEXT: *The Prince*, Niccolo Machiavelli, Anthony Grafton, George Bull, Penguin Classics, Reissue edition (Feb 4, 2003), ISBN# 0140449159
The New Economics, W. Edwards Deming, MIT Press, 2nd ed, ISBN# 9780262541169
Organizational Culture & Leadership, Edgar H. Schein, Jossey-Bass Publisher, 4th ed, ISBN# 9780470190609

TIME: TBD
PROF: Dr. Janice Tolk

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.

Recommended Background: Graduate standing in Engineering or Business.

EM 600 Doctoral Research/Dissertation (3-15)
SEC. 001 CRN 25777 Simonton
004 CRN 30285 Yu

Grading Restriction: P/NP only.

Repeatability: May be repeated.

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

INDUSTRIAL ENGINEERING

IE 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 001 CRN 21916 (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 – 10:45 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; Materials Science and Engineering 529; Mechanical Engineering 529; Nuclear Engineering 529).

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

MATERIAL SCIENCE ENGINEERING

MSE 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 001 CRN 21744 (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 – 10:45 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 Biomedical Engineering 529; Chemical and Biomolecular Engineering 529; Civil Engineering 529, Electrical and Computer Engineering 529; Environmental Engineering 529; Industrial Engineering 529; Nuclear Engineering 529).

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

MSE 578 Advanced Biomaterials; Biological Applications of Nanomaterials (3)
SEC. 002 CRN 30300 (Same as BME 578 002 CRN 30299)
TEXT: *Nanomaterials*; Dieter Vollath; Wiley; Second; ISBN: 978-3-527-33379-0
TIME: Monday & Wednesday 1:10 – 2:25 E-110
PROF: Dr. Jackie Johnson

Focuses on the biological/medical uses of nanoscale materials. Includes the following topics: 0-d, 1-d, and 2-d nanomaterials synthesis and characterization with an emphasis on surface properties. Chemical and biological functionalization of nanomaterials and nano-bio interfaces. Biological and biomedical application of nanomaterials. The state-of-the-art research papers will be reviewed and discussed.

Cross-listed: (Same as Biomedical Engineering 578.)

Recommended Background: 474.

Comment(s): Prior knowledge may satisfy prerequisites, with consent of instructor.

MATHEMATICS

Math 435 Partial Differential Equations (3)
SEC. 002 CRN 20423
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
PROF: Dr. Jan Zijlstra

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

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

MECHANICAL ENGINEERING

ME 500 Master's Thesis (1-15)
SEC. 001 CRN 21786 Abedi
021 CRN 21806 Anusonti-Inthra
022 CRN 21807 Majdalani

023 CRN 21808 Moeller
 024 CRN 21809 Schmisser
 025 CRN 21810 Solies
 026 CRN 21811 Vakili
 034 CRN 26350 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 25837 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 (3)

SEC. 001 CRN 21822

TEXT: Adrian Bejan; *Convection Heat Transfer*; 4th Edition; John Wiley

TIME: Monday & Wednesday 4:10 – 5:25 E-110

PROF: Dr. Feng Yuan Zhang

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 28483 (Same as AE 517 001 CRN 28514)

TEXT: K. J. Bathe; *Finite Element Procedures*. Cambridge, MA: Klaus-Jurgen Bathe, 2007.

ISBN: 9780979004902

T. J. R. Hughes; *The Finite Element Method: Linear Static and Dynamic Finite Element Analysis*, Dover Publications, 2000. ISBN: 978-0486411811

TIME: Tuesday & Thursday 1:10 – 2:25 E-110

PROF: 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)

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

Registration Permission: Consent of instructor.

ME 522 Thermodynamics II (3)

SEC. 001 CRN 21824
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 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 001 CRN 21826 (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 – 10:45 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 585 Turbomachinery Systems II (3)
SEC. 001 CRN 21831 (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 587 Dynamic Modeling and Simulation (3)
SEC. 002 CRN 28919 (Same as BME 587 002 CRN 28920)

TEXT: TBD
TIME: Tuesday & Thursday 2:40 – 3:55 E-110
PROF: Dr. Gary V. Smith

Modeling and analysis of physical systems. Systems and parameter identification. Mathematical modeling methods and approximations. Digital simulation techniques and practices. Design and control applications.

Cross-listed: (Same as Biomedical Engineering 587.)

Recommended Background: 363.

ME	590	Selected Engineering Problems (2-6)	
SEC.	002	CRN 21832	Abedi
	003	CRN 26338	Anusonti-Inthra
	005	CRN 26339	Majdalani
	006	CRN 26340	Moeller
	007	CRN 26341	Schmisseeur
	008	CRN 26342	Solies
	009	CRN 26343	Vakili
	010	CRN 26344	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 21833
TEXT: None
TIME: Will be announced through email
PROF: 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 ME: Space Environment Effects (3)
SEC. 002 CRN 27677 (Same as AE 599 001 CRN 24428)
TEXT: Vincent L. Piscane, *The Space Environment and Its Effects on Space Systems*, AIAA Education Series, 2008.

Supplemental text: Daniel Hastings and Henry Garrett, *Spacecraft-Environment Interactions*, Cambridge University Press, 1996.

Various other sources provided by instructor

TIME: Tuesday and Friday 1:00 – 2:15 E-113
PROF: Dr. Trevor Moeller

This is an introductory course on the effects of the space environment on space systems. The primary focus will be on the space environment in which satellites and spacecraft are in earth orbit. This environment contains many hazards, including: photons, particle radiation,

meteoroids, high-energy atoms, molecules, and ions, extreme temperature ranges, and orbital debris. This course will be split into two parts: 1) the space environment and 2) the interactions of the space environment with spacecraft.

Consent of instructor must be obtained to register.

Repeatability: May be repeated. Maximum 6 hours.

ME 599 Special Topics in ME: Computational Fluid Dynamics II (3) **CANCELLED**
SEC. 006 CRN 26637 (Same as AE 599 008 CRN 26861)
TEXT: No required text
TIME: Monday & Wednesday 11:40 – 12:55 E-110
PROF: Dr. Greg Powers

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. A personal computer with at least a 64-bit processor and 4 – 8 GB of RAM is required for this course.

Repeatability: May be repeated. Maximum 6 hours.

ME 599 Special Topics in AE: Computer Methods in Dynamics of Continua (3)
SEC. 013 CRN 28918 (Same as AE 599 003 CRN 27676)
TEXT: Thomas J.R. Hughes; *The Finite Element Method: Linear Static and Dynamic Finite Element Analysis*; Dover Civil and Mechanical Engineering, 2000
ISBN 978-0486411811. Recommended text only, not required.
TIME: Monday & Wednesday 11:40 – 12:55 E-110
PROF: Dr. Reza Abedi

This course is intended to serve as a sequel to an introductory finite element or computational mechanics courses. It is designed to deepen student's understanding of the characteristics of elliptic, parabolic, and hyperbolic partial differential equations (PDE) and get familiar with solution techniques for dynamic problems.

Prerequisite: ME 517

ME 600 Doctoral Research/Dissertation (3-15)
SEC. 015 CRN 21851 Abedi
016 CRN 21852 Anusonti-Inthra
018 CRN 21854 Majdalani
019 CRN 21855 Moeller
027 CRN 21863 Schmisseeur
028 CRN 21864 Solies
029 CRN 26346 Vakili
030 CRN 26347 Zhang

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

ME 601 Doctoral Research Methodology (3)
SEC. 002 CRN 30114
TEXT: TBD
TIME: TBD
PROF: Dr. Kivanc Ekici

Methods of planning and conducting original research and proposal writing.
Registration Restriction(s): Minimum student level – doctoral student.
Registration Permission: Departmental approval.

PHYSICS

Phys 500 Master's Thesis (1-15)
SEC. 002 CRN 23890 Davis
003 CRN 23891 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 23898
TEXT: None
TIME: 2nd & 4th Thursday 3:30 – 5:00 H-111
PROF: Dr. Lloyd Davis

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 506 Experimental Methods (3)
SEC. 001 CRN 30736
TEXT: None
TIME: TBD
PROF: Dr. Lloyd Davis

Introduction to experimental methods of spectroscopy through hands on operation of FTIR, Raman, NMR, photoelectron, laser and mass spectrometers. Principles and hazards of cw and pulsed lasers, radiation detectors, photomultiplier tubes, image intensifiers, image converters; high-vacuum systems including cryogenic-based devices, data acquisition techniques including lock-in amplifiers, box-car integrators, digital electronics methods and micro-computer data acquisition.

Phys 599 Modern Physics Seminars (3)
SEC. 007 CRN 23916

TEXT: None
TIME: TBD
PROF: Dr. Lloyd Davis

CLA Conference Room

(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. 010 CRN 30103
TEXT: None
TIME: 2nd & 4th Thursday 3:30 – 5:00 H-111
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. 002 CRN 23919 Davis
003 CRN 23920 Parigger

Grading Restriction: P/NP only.

Repeatability: May be repeated.

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

Phys 602 Atomic Physics (3)
SEC. 001 CRN 30735
TEXT: *Theoretical Atomic Physics* (primary course book reference for spring 2015) and a variety of selected sections from other books (such as F. Schwabl *Advanced Quantum mechanics*) and current research literature; H.S. Friedrich; Springer Verlag; Corr. 2nd printing edition (March 1, 2004); ISBN 10:3540641246; ISBN 13:978-3540641247
TIME: Monday & Thursday 1:00 – 2:15 E-111
PROF: Dr. Christian Parigger

Advanced problems.

Comment(s): For students specializing in the field.

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