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The University of Tennessee
 Space Institute
 411 B.H. Goethert Parkway
 Tullahoma, TN 37388-9700
 888-822-8874 x-37228
www.utsi.edu

See Inside for Online Registration Instructions
 Publication Number: E02-4001-002-10
<https://cpo.utk.edu/CPOWeb>

CALENDAR - 2010 SPRING SEMESTER

Priority Registration.....	September 28, 2009 – January 6, 2010
Admission to Candidacy Forms for Spring 2010 Commencement	December 1, 2009
Spring 2010 Graduation Application Deadline	December 1, 2009
University Closed, but CPO.UTK.EDU is available	December 24, 2009 – December 30, 2009
Late Registration and late fees begin	January 7, 2010 – January 22, 2010
Classes begin.....	January 13, 2010
Last Day to Late Register, Add, Change Grading Options or Drop Without a “W”	January 22, 2010
Martin Luther King Holiday	January 18, 2010
Last day to add/change credit with signatures	February 23, 2010
Graduation Fee Payment Deadline (MS \$30, PhD \$75).....	March 5, 2010
Preliminary Thesis/Dissertation Review Deadline	March 5, 2010
Last day to schedule final exam (thesis)	March 26, 2010
Last day to schedule final exam (non-thesis/capstone students).....	March 26, 2010
Spring Break (No Classes).....	March 8-12, 2010
Last day to schedule final exam (dissertation).....	March 30, 2010
Purchase cap and gown and order hood.....	March 30, 2010
Register to attend the Graduate Hooding Ceremony (http://gradschool.utk.edu)	March 30, 2010
Drop with a “W”	April 6, 2010
Last day to take final exam (thesis/dissertation students).....	April 9, 2010
Last day to take final exam (non-thesis/capstone students).....	April 9, 2010
Spring Recess (No Classes)	April 2, 2010
Electronic Thesis/Dissertation due in Knoxville (5:00 P.M. EST).....	April 23, 2010
Submit report of final examination (Pass/Fail) form	April 23, 2010
Deadline for Submission of Admission to Candidacy for students Graduating Summer 2010 and Graduation Application.....	April 30, 2010
Deadline for removing "INCOMPLETE" grades	April 30, 2010
Classes End	April 30, 2010
Total Withdraw from the University Deadline	April 30, 2010
Study Period.....	May 3, 2010
Exam Period.....	May 4, 5, 6, 2010
Graduate Hooding Ceremony (UTK)	May 13, 2010
COMMENCEMENT (UTK)	May 12, 2010
Second thesis/dissertation deadline (Student will receive diploma August 2010 but do not have to register for Summer 2010) (Defense Completed by April 30) ...	May 28, 2010

SUMMER SEMESTER 2010

Priority Registration for Summer Semester 2010 UTSI begins.....	TBD
Final Registration for UTSI students	TBD
Memorial Day Holiday	May 31, 2010
Classes begin.....	June 3, 2010
July 4 th Holiday	July 5, 2010
Classes End	August 10, 2010
Summer Graduation Date on Transcript (No Ceremony).....	August 18, 2010

**SPRING SEMESTER 2010
FINAL STUDY DAY AND EXAM SCHEDULE**

LAST DAY OF CLASSES.....April 30, 2010

STUDY PERIOD May 3, 2010

FINAL EXAMS 2010

REGULAR CLASS TIME	(Same Classroom)	EXAM TIME
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1st Day - Tuesday, May 4, 2010

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 5, 2010

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, 6, 2010

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 2010**

REGISTRATION PROCEDURE

ADVISING

Graduate students should contact their departmental faculty to arrange an advising appointment. The web registration system will ask if you have discussed your program with your advisor. Answer “yes” if you have.

REGISTRATION

UTSI students **MUST** register for the 2010 Spring semester on the Web at Circle Park Online <https://cpo.utk.edu/CPOWeb/> . The registration system will be available Monday through Saturday, 6:00 AM - 11:00 PM (CST) and Sundays 12:00 PM - 5:00 PM (CST). Registration will be September 28, 2009 – January 6, 2010. Late registration will be January 7, 2010. Classes begin January 13, 2010.

Plan your schedule. Here’s a table to help with this process:

Department Number	Course Number	Section Number	Spec.Credit/ Grading	Credit Hours	Hours/Days	Place

Students log on to CPO using their Net ID and password. If you do not know your Net ID and Password, please visit the University Registrar's website at http://registrar.tennessee.edu/student_id.shtml . Scroll down the page to "What is a Net ID and Net ID password?" You will find helpful information about obtaining Net IDs and Net ID passwords.

CPO Technical Support: Send email including your return email address in the text of your message to cpo@utk.edu

Days of the Week

M-Monday T-Tuesday W-Wednesday R-Thursday F-Friday S-Saturday

Financial Calendar for Spring Term 2010

Last Registration Day for Receiving Statements by Mail	November 17, 2009
Statement Information Available on CPO	November 17, 2009
Priority Registration Payment/Confirmation Deadline	January 6, 2010 (3:30 pm CST)
Late Registration/Late Fees Begin	January 7, 2010
Late Payment and Confirmation Deadline	January 22, 2010 (3:30 pm CST)

CREDIT CARD PAYMENTS

**** NOTE:** If you pay your fees using Circle Park Online (CPO) using a credit/debit card (Discover, VISA, Mastercard) you will be assessed a 2.5% service fee. To avoid this service fee you will need to make payment to the UTSI Business Office.

SPECIAL BILLING – THIRD PARTY BILLING:

The Business Office will generate a billing after the student has provided a letter of authorization from the third party sponsor. Authorization must include the sponsor's name and address as well as the maximum amount which will be paid for each specific term. The authorization can be mailed to UTSI Business Office, MS#12, 411 B.H. Goethert Parkway, Tullahoma, TN 37388-9700 or email it to jboyles@utsi.edu. Since students are responsible for all University fees and charges, use of the third-party address as the student's billing address is strongly discouraged.

STUDENTS ARE ULTIMATELY RESPONSIBLE FOR ALL CHARGES. THEY MUST COMPLETE A CONFIRMATION OF ATTENDANCE FORM AND MAKE CERTAIN MINIMUM PAYMENT AMOUNTS CREDITED OR AUTHORIZED ON OR BEFORE THE PAYMENT DUE DATE IN ORDER TO AVOID LATE PAYMENT FEE ASSESSMENT AND SCHEDULE CANCELLATION.

If you have any questions concerning third-party billing please call Jennifer Boyles at 931-393-7297 or 888-822-8874 ext 37297 or by email jboyles@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)-37293
Bookstore:	1-888-822-UTSI (8874)-37204
Business Office:	1-888-822-UTSI (8874)-37204
Registrar's Office:	1-888-822-UTSI (8874)-37228

BOOKSTORE HOURS

The Bookstore is located in Lower C-Wing. The Bookstore hours are 8:00 a.m. - 4:00 p.m. All textbooks will be returned to the publisher one week after midterm. For further information concerning books contact the Bookstore, ext. 37204 or 37314 or by email Robin Nee at mee@utsi.edu or Vicki Carr at vcarr@utsi.edu.

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 must be accompanied by a \$35.00 non-refundable application fee, payable to The University of Tennessee Space Institute. Applicants are required to provide one official transcript of all undergraduate and graduate records. Students may apply on-line at <http://admissions.utk.edu/graduate/apply.shtml> [click on APPLY ONLINE and Follow Directions]. Applications for Admission and Transcripts from part-time students should be sent to the Registrar's Office, D-100, Mail Stop 7, UTSI, Tullahoma, TN 37388-9700. Full-time students send Application for Admission, transcripts, GRE scores (if required); and if international application, TOEFL scores to the Admissions Office, E-109, Mail Stop 19, UTSI, Tullahoma, TN 37388-9700.

PAYMENT OF FEES

Payment of fees is due at time of registration. Late fees will begin on January 7, 2010. The only credit/debit cards The University of Tennessee Space Institute accepts are Visa, MasterCard and Discover.

FEES OF DISTANCE STUDENTS

Distance students should contact their departmental coordinator to determine the amount of the access fee.

Aviation Systems	Stephen Corda	931-393-7413	scorda@utsi.edu
Engineering Mgt.	Dee Merriman	931-393-7293	dmerrima@utsi.edu

TUITION AND/OR MAINTENANCE FEES*

Full Fees For In-State Students (per semester)

Maintenance Fee	\$3,413.00*
Programs and Services Fee	90.00
Total	\$3,503.00

Full Fees For Out-Of-State Students (per semester)*

Maintenance Fee	\$3,413.00*
Programs and Services Fee	90.00
Tuition	\$6,898.00*
Total	\$10,401.00

***All fees are subject to changes approved by the Board of Trustees prior to the beginning of the term.**

TUITION FOR PART-TIME STUDENTS

Part time students may elect to pay fees computed by the semester hour credit as follows:

IN-STATE	\$380.00 per semester hour
3 hours	\$1,140.00
OUT-OF-STATE	\$1,147.00 per semester hour
3 hours	\$3,441.00

PROGRAMS AND SERVICES FEE

All students enrolled in nine semester hours or more for Fall or Spring Semester are assessed an activity fee of \$90.00 per semester. Part-time students taking fewer than nine hours will be assessed at the rate of \$10.00 per semester hour. The Programs and Services Fee is non-refundable. Research Assistants and Fellowship/Scholarship Students who may have a waiver of fees (tuition), must pay appropriate University Programs and Services Fee.

Part-time students enrolled for videotape classes at off campus centers and students residing out of state are not required to pay the Programs and Services Fee.

RETURNED CHECK POLICY

All checks are deposited the day they are received. A \$30.00 service charge will be assessed when checks fail to clear the bank on which drawn. In addition, if the returned check is in payment of initial fees and charges, the late payment fee in effect at the time the check is redeemed will be added to the returned check service fee. Returned checks will not be re-deposited. Cash or a cashier's check is required for payment of a returned check, late fee, and service charges. Failure to clear returned checks will result in the forfeiture of all University services including the receipt of grades, transcripts, and schedules of classes.

DEFERRED PAYMENT PLAN

Although fees, rent and other University expenses are due and payable at the beginning of each term, a full-time student in good financial standing with a definite anticipated source of funds may request the deferment of up to 50% of the total charges at registration. The deferred payment must be paid by the 45th (February 19, 2010) day of the semester. All financial aid monies must be applied to fees before a deferment will be considered. A deferred payment service fee of \$20.00 is assessed when any portion of tuition, fees, and other charges are deferred with the approval of the Business Office. An additional \$35.00 late payment charge will be assessed if the second installment is not paid on or before the due date. For more details, contact the Business Office.

LATE PAYMENT FEES

A **Late Payment Fee** of \$35.00 will be added to each *VOLXpress* account if the minimum payment amount which is printed on the statement is not received by the Bursar's Office on or before the published due date. This does not include beginning of term registration statements which will result in cancellation of schedules if the minimum payment is not met. Late payment fees are exclusive of all other charges and are due when assessed whether or not the student receives a *VOLXpress* statement. Accounts are subject to a late fee of \$45.00 if there is an

account balance at mid-semester. The fee is assessed in addition to the unpaid fees and charges and the account balance must be paid in order to access registration services, receive a transcript, grades, or a diploma.

TUITION/FEE POLICY FOR DROPPED COURSES OR WITHDRAWAL

THE PERCENTAGE TUITION REFUNDS SPECIFIED ON THE FOLLOWING PAGE ARE APPLICABLE WHEN A STUDENT DROPS ONE OR MORE COURSES (INCLUDING TOTAL WITHDRAWAL). Students who drop courses and continue with a reduced course load are eligible for a refund only if the total charges at the semester hour rate for the courses continued plus the percentage assessed at the semester hour rate for the courses dropped results in an amount less than that paid. The Programs and Service Fee is non-refundable.

A COURSE IS NOT OFFICIALLY DROPPED UNTIL A CHANGE OF REGISTRATION FORM HAS BEEN PROCESSED BY THE REGISTRAR'S OFFICE. CANCELED COURSES OR FAILURE TO ATTEND CLASS DOES NOT AUTOMATICALLY WITHDRAW OR DROP A STUDENT FROM THE UNIVERSITY OR CLASS --- A CHANGE OF REGISTRATION FORM MUST BE COMPLETED.

The following percentage assessments are applicable for courses dropped (if fees are assessed at the semester hour rate):

DROP DATE	CHARGE	REFUND
January 13 - 17	NO CHARGE	100%
January 18 - 23	20% CHARGE	80%
January 24 - 28	40% CHARGE	60%
January 29 – February 2	60% CHARGE	40%
February 3 - End of Term	100% CHARGE	NO REFUND

TUITION/FEE REFUND POLICY FOR WITHDRAWALS

Withdrawal from school for the term after registration has been processed, even though classes have not been attended or fees paid, must be by official notification to the Registrar's office. The effective date of withdrawal is the date the Registrar's office is notified by completion of the Change of Registration request form. FAILURE TO ATTEND CLASS DOES NOT AUTOMATICALLY CANCEL ENROLLMENT. The appropriate percentage of fees will be charged unless the Registrar's Office is notified by the close of the last day designated for registration and before the first official day of classes for the semester or term. WITHDRAWAL DOES NOT CANCEL FEES AND CHARGES ALREADY INCURRED. THE DROP/ADD PROCEDURE CAN NOT BE USED TO WITHDRAW FROM SCHOOL FOR THE SEMESTER OR TERM. When a course is canceled by UTSI administration, the students who have registered for the course will be notified by either the instructor and/or the Registrar's Office and required to file a Change of Registration form with the Registrar's Office, UTSI, Room D-100, 393-7228.

The University of Tennessee Space Institute, in accordance with federal regulations, follows the policy and procedures below for calculating refunds and repayments for financial aid.

REFUNDS

Refunds are defined as the portion of maintenance and/or tuition and University housing charges due as rebate when a student withdraws or is expelled from the University. The amount of a refund is determined by the Drop Date Charge fee table on this page.

REPAYMENTS

Repayments are defined as that portion of aid, received by a student after the University direct charges have been paid by that aid, that must be repaid by a student when a student withdraws or is expelled. The amount of the repayment is determined by the Drop Date Charge fee table on the previous page.

Refunds and repayments to the Title IV programs are determined according to the formula published in the current Federal Student Financial Aid Handbook. The Business and Admissions Offices are responsible for determining the amount of the refund and/or repayment and distributing the correct amount back to the financial aid programs according to the Refund/Repayment Allocation Policy.

WITHDRAWAL (TOTAL) 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 the Registrar's Office 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 <https://cpo.utk.edu/CPOWeb/enterCPO.jsp> or by calling 865-656-2527. Grades will not be mailed unless a printed copy is requested through the web address. Students will be prompted to enter their ID number and their Personal Security Code. There is a limit of 8 telephone calls per student, per semester. Unlimited access is available via the Internet. Grades may also be obtained through the Registrar's Office at UTSI.

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 the Registrar's Office 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 Dean for Academic Affairs.

REMOVAL OF INCOMPLETE GRADES

All Incomplete Grades (I) must be removed within one semester, excluding the Summer Term. If a supplementary grade report has not been received in the Registrar's Office at the end of the following semester, the I will be changed to an E. The course will not be counted in the cumulative grade point average until a final grade is assigned. Students wishing to graduate Spring Semester 2010 must remove all INCOMPLETE GRADES by **April 30, 2010**.

It is the responsibility of the student to contact the instructor and the instructor's responsibility to complete a Grade Change form. The Registrar's Office cannot change a grade on verbal instructions only.

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 to the Registrar's Office a completed and signed Application for Admission to Candidacy form at least one semester prior to receiving the degree.

Candidacy committee changes or course changes must be submitted to the Committee Chairman using a Change of Committee/Course for approval. This form is available in the UTSI Registrar's Office.

ADMISSION TO CANDIDACY

DOCTOR OF PHILOSOPHY DEGREE:

A Doctoral Committee should be formed during the student's first year of doctoral study and submitted to the Registrar's Office for approval. The form is available in the UTSI Registrar's Office. Any changes to the doctoral committee (deletions or additions) must be done through the Registrar's Office. Each Ph.D. student is responsible for submitting to the Registrar's Office a completed Admission to Candidacy form signed by the Doctoral Committee at least one semester prior to receiving the degree. The Candidacy form must be approved by the UTK Graduate School before a student will be admitted to candidacy. The comprehensive examination must be passed prior to admission to candidacy.

CONTINUOUS REGISTRATION OF DOCTORAL STUDENTS

All doctoral students must be registered for doctoral dissertation research course 600 (minimum of 3 hrs.) on a continuous basis starting when the doctoral research proposal is approved, admission to candidacy is accepted, or registration for course 600 is begun, whichever comes first, including ALL Summer terms and the semester in which the dissertation is approved and accepted by The Graduate School. A leave of absence may be requested for extenuating circumstances. The procedure can be found in the UTK Graduate catalog.

FINAL EXAMINATION 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 the Registrar's Office. Failure to notify the Registrar's Office 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 2010 academic year is provided by United Health Care. The premium must be paid before registration. Contact the Human Resources Office (C-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 FOR SPRING SEMESTER 2009

STUDY PERIOD....May 3, 2010

FINAL EXAMS.....May 4, 5, 6, 2010

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 in the Registrar's Office, D-100.

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.

SPECIAL ANNOUNCEMENT

THOMAS JEFFERSON LECTURE

April, 2010 (Date to be determined)

3:00 P.M.

UTSI Auditorium

There will be **NO** scheduled classes at this time by request of Dr. Stephen Corda, Interim UT Associate Vice President and Chief Administrator Associate Professor and Chairman Aviation Systems and Flight Research Program

Faculty will reschedule any afternoon classes tentatively scheduled for April (TBD), 2010 between 2:30 – 3:45 p.m.
Contact the Registrar's Office
For available times and rooms for rescheduling

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

**THE UNIVERSITY OF TENNESSEE SPACE INSTITUTE
SPRING SEMESTER 2010 COURSE LISTINGS**

AEROSPACE ENGINEERING

AE 500 Master's Thesis (1 - 15)
SEC. 001 Schulz
009 Antar
010 Flandro
011 Majdalani
012 Moeller
013 Steinhoff
014 Vakili
015 Moulden
021 Corda

AE 502 REGISTRATION FOR USE OF FACILITIES (1 - 15)
SEC. 002 Dr. Basil Antar

AE 512 VISCOUS FLOW (3)
SEC. 001 (Videotaped at UTSI)
TIME: Monday & Thursday 1:00 – 2:15 E111
TEXT: F. White: Viscous Flow; 2nd Ed., ISBN# 0-07-069712-4
PROFESSOR: Dr. Ahmad Vakili

Equations of viscous fluid flow; exact and approximate solution; laminar and turbulent flow; transition; separation; boundary layer theories; exact and approximate solution. *Prerequisite: AE 521.*

*AE 522 AERODYNAMICS OF COMPRESSIBLE FLOWS II (3) **CANCELLED**
SEC. 001
TIME: Monday & Thursday 10:45 – 12:00 B112
TEXT: TBD
PROFESSOR: Dr. Trevor Moulden

One-dimensional internal and external flow; waves; small perturbation theory; slender body theory; similarity rules; method of characteristics. *Prerequisite: 521.*

AE 539 CONTINUUM MECHANICS (3)
SEC. 002 (Same as ES 539/ME 539)
TIME: Monday & Thursday 9:15 – 10:30 B112
TEXT: L. E. Malvern: Introduction to the Mechanics of a Continuous Medium; Prentice Hall, ISBN# 13 487603 2
PROFESSOR: Dr. T. H. Moulden

Cartesian tensors, transformation laws, basic continuum mechanics, concepts; stress, strain, deformation, constitutive equations. Conservation laws for mass, momentum, energy. Applications in solid and fluid mechanics.

AE 542 FLUID MECHANICS II (3)
SEC. 001 (Same as ES 542/ME 542)
TIME: Tuesday & Friday 9:15 – 10:30 E211
TEXT: 1. H. Tennekes & J. Lumley: A First Course in Turbulence, MIT, Latest Ed.
2. R.L. Panton: Incompressible Flow; Wiley Interscience; Latest publications
PROFESSOR: Dr. Basil Antar

Inviscid flow, boundary layers, laminar jets, wakes and shear layers. Transition to turbulence. Turbulent flow, Reynolds averaged equations, dynamics of turbulence, boundary free turbulent shear flow, turbulent channel's pipe flow, turbulent boundary layers.

AE 590 SELECTED ENGINEERING PROBLEMS (1-3)
SEC. 001 Dr. Basil Antar
SEC. 002 Dr. Monty Smith
SEC. 003 Dr. Ahmad Vakili

AE 595 SEMINARS: AEROSPACE and MECHANICAL SYSTEMS (1)
SEC. 001 Dr. Ahmad Vakili (Same as ME 595)

Seminars in all phases of Aerospace Engineering, reports on current research at UTK and UTSI. May be repeated.

AE 599 AIRCRAFT DESIGN (3)
SEC. 001 (Cross-Listed as AS506 Section 001) Videotaped from UTSI
TIME: Tuesday & Friday 1:00 – 2:15 E111
TEXT: D.P. Raymer: Aircraft Design: A Conceptual Approach; AIAA Education Series; 3rd Ed., 1998. ISBN # 1-56347-281-0
PROFESSOR: Dr. U. Peter Solies

Review of air vehicle aerodynamics and performance, 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.

AE 599 SPECIAL TOPICS IN AE: ROCKET PROPULSION I (3)
SEC. 002 (Same as ME 581 Sec. 001)
TEXT: Rocket Propulsion Elements; George P. and Biblarz, Oscar; Wiley; 7th Edition; ISBN# 041326429.
TIME: Wednesdays 4:00 – 6:35 E111
PROFESSOR: Dr. Joseph Majdalani

Rocket propulsion fundamentals; thermodynamics of non-reacting and chemically reacting ideal gases, rocket nozzle design; ideal rocket performance parameters; rocket heat transfer; chemistry of propellants; liquid rocket engine systems; ground testing; introduction to solid propellant rockets.

AE 599 SPECIAL TOPICS: RADIATION TRANSPORT (3)
SEC. 003 (Same as ME 599 Sec. 003//ES 581 Sec. 002)
TIME: Tuesday & Friday 10:45 – 12:00 F252
TEXT: Thermal Radiation Heat Transfer; Robert Siegel and John R. Howell; Taylor and Francis;
4th Edition; ISBN# 1-56032-839-8.
PROFESSOR: Dr. Trevor Moeller

Supplemental Text: Maher I. Boulos, Pierre Fauchais, and Emil Pfender, Thermal Plasmas: Fundamentals and Applications; Vol. 1; Plenum Press; ISBN # 0-306-44607-3.

This course will cover fundamental radiation processes that occur in absorbing, emitting, and radiating media (plasmas and high temperature gases). Topics will include: blackbody radiation concepts, fundamentals of radiation in matter, classical radiation, quantum theory of radiation, line broadening, continuum radiation, equilibrium relations, and an introduction to spectral diagnostics of plasmas.

*AE 599 SPECIAL TOPICS: TRANSONIC FLOW (3) **CANCELLED**
SEC. 004 (Video Recorded)
TIME: Monday & Wednesday 10:30 – 11:45 E111
TEXT: Fundamentals of Transonic Flow; T.H. Moulden; Krieger, 1991; ISBN 0-89464-441-6.
PROFESSOR: Dr. Trevor Moulden

Nature of flow at transonic speeds; small disturbance theory; shock wave properties; shock-free flows; strong viscous interaction phenomena; solution techniques.

AE 600 DOCTORAL & RESEARCH DISSERTATION (3 - 15)
SEC. 005 Antar
006 Moeller
007 Majdalani
008 Steinhoff
010 Corda
016 Flandro
017 Vakili

*AE 661 ADVANCED TOPICS IN COMPUTATIONAL FLUID DYNAMICS (3) **CANCELLED**
SEC. 001 (Same as ES 651/ME 651)
TIME: Tuesday & Friday 10:45 – 12:00 E210
TEXT: TBD
PROFESSOR: Dr. John Steinhoff

Modern approximation theory for Euler and Navier-Stokes conservation systems, compressible flow, hyperbolic forms, boundary conditions. Weak forms, extremization, finite element/finite volume/flux vector discrete implementations, a priori error estimates, accuracy, convergence, stability. Numerical linear algebra, approximate factorization, sparse matrix methods. Dissipation, Fourier spectral analysis, smooth and non-smooth solutions. (*Same as Engineering Science 651; Mechanical Engineering 651.*)

*AE 681 ADVANCED VISCOUS FLOW THEORY (3) **CANCELLED**
SEC. 001
TIME: Tuesday & Friday 10:45 – 12:00 B112
TEXT: Lecture Notes

PROFESSOR: Dr. Trevor Moulden

Critical review of significance to governing equations. Nature of boundary layer approximation as singular perturbation problem. Uniqueness and existence of solutions. Application of group theory. Special problem areas of interest to students. The Navier Stokes Equations and their mathematical properties.

AE 690 ADVANCED TOPICS IN AE: LINEAR AND NONLINEAR WAVES (3)

SEC. 001 (Cross listed with ES 681 Section 001)

TIME: Monday & Thursday 4:15 – 5:30 B210

TEXT: GB. Witham: Linear and Nonlinear Waves

P.C. Drazin & R.S. Johnson: Solitons: An Introduction; ISBN# 0521336554

PROFESSOR: Dr. John Steinhoff

The basic properties of many important physical phenomena can often be modeled by partial differential equations with simple nonlinear terms. These range from pattern formation in water waves to predator-prey dynamics and optical pulse propagation in fibers. Representative classes of equations will be studied and their solutions characterized. An important sub-topic will be solitary waves and especially solitons. Solitons have recently been extensively studied as very important and interesting solutions of many nonlinear partial differential equations: they propagate without changing shape, even after interacting with each other, they are represented in many important physical phenomena, from optical pulses to tidal bores, and are studied as models of elementary particles. The course will consist of a survey of the field followed by a study of the methods of solving nonlinear partial differential equations which lead to soliton solutions. The emphases will be on physical arguments and analysis. *Prerequisite: include Elementary Partial Differential Equations and Advanced Calculus.*

AE 690 ADVANCED TOPICS IN AE: ADVANCED PERTURBATION METHODS (3)

SEC. 002 (Video Recorded)

TEXT: Class Notes

TIME: Monday 4:00 – 6:35 E111

PROFESSOR: Dr. Joseph Majdalani

Objectives: The purpose of this course is to advance students through real life problems requiring the subtle use of asymptotic methods. The goal is to solve problems that arise in propulsion related applications or other fields of science. By the end of the course students will be able to: understand the use of several advanced perturbation techniques; these include: 1) WKB Method (Type I and Type II) with Multiple Distinguished Limits 2) Latta's Method of Composite Expansions 3) Method of Averaging (van der Pol's Method/ Krylov-Bogoliubov Method) 4) Asymptotic Expansion of Integrals (Watson's Lemma) 5) Laplace's Method. Obtain perturbation solutions to complex physical settings involving small or large parameters; understand how to model highly oscillatory solutions; treat partial differential equations; treat problems exhibiting a nonlinear scaling structure; treat compressible flow problems. *Prerequisites: Differential Equations and Perturbation Methods I.*

AVIATION SYSTEMS

AS	500	MASTER'S THESIS (1 - 15)
SEC.	001	Corda
	002	Collins
	003	Martos
	004	Muratore
	005	Pujol
	006	Solies
AS	502	REGISTRATION FOR USE OF FACILITIES (1-15)
SEC.	001	Corda
	002	Collins
	003	Martos
	004	Muratore
	005	Pujol
	006	Solies

Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated.

AS	506	AIRCRAFT DESIGN (3)
SEC.	001	(Cross Listed as AE 599 Section 001) (Video Recorded)
TIME:	Tuesday & Friday	1:00 – 2:15 E111
TEXT:	D. P. Raymer: <u>Aircraft Design: A Conceptual Approach</u> ; AIAA Education Series; 3rd Ed., 1998. ISBN # 1-56347-281-0	
PROFESSOR:	Dr. U. Peter Solies	

Review of air vehicle aerodynamics and performance, 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.

AS	510	SPECIAL TOPICS: INTRODUCTION TO AVIONICS II (3)
SEC.	001	(Video Recorded)
TIME:	Tuesday & Friday	10:30 – 11:45 E113
TEXT:	Len Buckwalter: <u>Avionics Training for Systems, Installation and Troubleshooting</u> : Avionics Communications Inc, Latest Edition; ISBN# 1-88-5544-21-9	
PROFESSOR:	Dr. Alfonso Pujol, Jr.	

Avionic systems and communications, including analog and digital systems, distance measuring equipment, transponder, radar altimeter, GPS/satellite navigation, electronic flight instrument system, cockpit voice and flight data recorders, weather detection, traffic alert and collision avoidance system, electrical systems, aviation bands and frequencies, and other topics are also discussed.

AS	510	SPECIAL TOPICS: SYSTEMS ENGINEERING (3)
SEC.	002	(Video Recorded)
TIME:	Monday & Thursday	1:30 – 2:45 E113

TEXT: Systems Engineering Principle and Practice; Alexander Kossiakoff and William Sweet; ISBN 0-471-23443-5
Inviting Disaster – Lessons from the Edge of Technology; James R. Chiles; ISBN 0-06-662081-3;
The Secret of Apollo, Systems Management in the American and European Space Programs; Stephen B. Johnson; ISBN 0-8018-8542-6.

PROFESSOR: John Muratore

The focus of this course is on engineering problem solving in multi-disciplinary applications with complex systems interactions. Instruction will be provided in methodologies and tools used to deal with large complex systems to deliver system performance that meets user requirements. Methodologies discussed will include system life cycles, requirements development, verification and validation, engineering review processes, hazard analysis, fault trees, reliability block diagrams, system flow diagrams, weight and cost estimating, technical budget management, engineering economic analysis, interface control, and deterministic and monte carlo definition of integrated flight design environments. Special topics will include software integration; interconnect wiring, fault tolerance and redundancy management.

AS 516 Aircraft Flight Controls (Stability and Control)

SEC. 001 (Interactive Receive)

TIME: Monday & Thursday 10:30 – 11:45 E111

TEXT: Introduction To Aircraft Flight Mechanics; Yechout, Morris, Bossert, and Hallgren; AIAA Press; 1st Edition; ISBN # 10:1-56347-577-4, ISBN # 13:978-1-56347-577-1.

PROFESSOR: Dr. Andrew Meade

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
- Introduction to control theory and design of automatic controls

AS 521 EXPERIMENTAL FLIGHT MECHANICS: FIXED WING PERFORMANCE (3)

SEC. 001

TIME: Tuesday & Friday 8:00 - 9:15 Tullahoma Airport Classroom

TEXT: Ralph D. Kimberlin; Flight Testing of Fixed-Wing Aircraft; AIAA Education Series; ISBN# 1 56347 564 2

PROFESSOR: Borja Martos

This course will cover fundamental theories, flight test techniques, and data collection and analyses for fixed wing aircraft performance. Topics will include air data system calibration, takeoff and landing performance, turn performance, cruise performance, energy concepts, and aerodynamic modeling. Course structure will be weekly classroom academics with approximately 4-6 flight labs evenly distributed during the semester. This course is designed for full-time attendance during the semester and will not be offered as a Distance Learning course.

AS	550	PROJECT IN AVIATION SYSTEMS (3)
SEC.	001	Corda
	002	Collins
	003	Martos
	004	Muratore
	005	Pujol
	006	Solies

Enrollment limited to Aviation Systems students in non-thesis program. May be repeated. Maximum 3 hrs allowed toward degree.

CHEMICAL/BIOMEDICAL ENGINEERING

CBE	529	APPLICATION OF LINEAR ALGEBRA IN ENGINEERING SYSTEMS (3)
SEC.	001	(Video Recorded) (Same as ECE/IE/MSE/ME 529)
TITLE: <u>Advanced Linear Algebra for Engineers with MATLAB</u> ; Sohal A. Dianat and Eli S. Saber; CRC Press, Taylor and Francis Group, 2009; ISBN-13: 978-1-4200-9524-4 (Hardcover); ISBN-10: 1420095234; List Price: \$99.95.		
TIME:	Monday & Thursday	9:45 – 11:00 E113
PROFESSOR:	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. (*Same as Biomedical Engineering 529; Industrial Engineering 529; Materials Science and Engineering 529; Mechanical Engineering 529*). *Comment(s): Graduate standing or consent of instructor required.*

Comments: Methods of linear algebra as applied to engineering. Topics to be covered include: systems of linear equations, matrices, solutions of linear equations, Gaussian elimination, vector spaces, linear transformations, orthogonality, least-squares approximations, determinants, eigenvalues and eigenvectors, positive definite matrices, singular value decomposition, and numerical computational methods. Course assignments will consist of pencil-and-paper exercises and numerical exercises involving MATLAB. Students registering for this course are assumed to have access to at least the Student Edition of MATLAB.

COMPUTER SCIENCE

NOTE: Students interested in the Interdisciplinary Graduate Minor in Computational Science (IGMCS) at UTSI should contact Dr. Bruce Whitehead (bwhitehe@utsi.edu, 931-393-7296) for further information.

CS	472	NUMERICAL LINEAR ALGEBRA (3)
SEC.	001	Videotaped Recorded (Same as Math 472)
TEXT: Burden & Faires: <u>Numerical Analysis</u> ; 8th Ed., Brooks/Cole; ISBN: 0-534-38216-9		
TIME:	Monday & Wednesday	2:30 – 3:45 E111
PROFESSOR:	Dr. Trevor Moulden	

Direct and iterative methods for systems of linear equations. Solution of single nonlinear equations and nonlinear systems. Orthogonal decomposition, least squares and algebraic eigenvalue problem. *Prerequisite: Numerical Algorithms 1 or consent of instructor. Recommended prerequisite: 453.*

ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

ECE 500 THESIS (1 – 15)
 SEC. 001 Bomar
 015 Smith
 022 Pujol
 023 Whitehead

ECE 501 PROJECT IN LIEU OF THESIS (3)
 SEC. 001 Bomar
 002 Smith
 005 Pujol
 006 Whitehead

ECE 502 REGISTRATION FOR USE OF FACILITIES (1-15)
 SEC. 003 Smith

ECE 529 APPLICATION OF LINEAR ALGEBRA IN ENGINEERING SYSTEMS (3)
 SEC. 001 (Video Recorded) (Same as IE/MSE/ME/CBE 529)

TITLE: Advanced Linear Algebra for Engineers with MATLAB; Sohal A. Dianat and Eli S. Saber; CRC Press, Taylor and Francis Group, 2009; ISBN-13: 978-1-4200-9524-4 (Hardcover); ISBN-10: 1420095234; List Price: \$99.95.

TIME: Monday & Thursday 9:45 – 11:00 E113
 PROFESSOR: 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. (*Same as Biomedical Engineering 529; Industrial Engineering 529; Materials Science and Engineering 529; Mechanical Engineering 529*). *Comment(s): Graduate standing or consent of instructor required.*

Comments: Methods of linear algebra as applied to engineering. Topics to be covered include: systems of linear equations, matrices, solutions of linear equations, Gaussian elimination, vector spaces, linear transformations, orthogonality, least-squares approximations, determinants, eigenvalues and eigenvectors, positive definite matrices, singular value decomposition, and numerical computational methods. Course assignments will consist of pencil-and-paper exercises and numerical exercises involving MATLAB. Students registering for this course are assumed to have access to at least the Student Edition of MATLAB.

ECE 600 DOCTORAL RESEARCH AND DISSERTATION (3-15)
SEC. 022 Dr. Bruce Bomar

ENGINEERING SCIENCE

ES 500 Master's Thesis (1 - 15)
SEC. 001 Schulz
010 Antar
011 Flandro
012 Majdalani
013 Moeller
014 Steinhoff
015 Vakili

ES 539 CONTINUUM MECHANICS (3)
SEC. 002 (Same as AE 539/ME 539)
TIME: Monday & Thursday 9:15 – 10:30 B112
TEXT: L. E. Malvern: Introduction to the Mechanics of a Continuous Medium; Prentice Hall,
ISBN# 13 487603 2
PROFESSOR: Dr. T. H. Moulden

Cartesian tensors, transformation laws, basic continuum mechanics, concepts; stress, strain, deformation, constitutive equations. Conservation laws for mass, momentum, energy. Applications in solid and fluid mechanics.

ES 542 FLUID MECHANICS II (3)
SEC. 001 (Same as AE 542/ME 542)
TIME: Tuesday & Friday 9:15 – 10:30 E211
TEXT: 1. H. Tennekes & J. Lumley: A First Course in Turbulence, MIT, Latest Ed.
2. R.L. Panton: Incompressible Flow; Wiley Interscience; Latest publications
PROFESSOR: Dr. Basil Antar

Inviscid flow, boundary layers, laminar jets, wakes and shear layers. Transition to turbulence. Turbulent flow, Reynolds averaged equations, dynamics of turbulence, boundary free turbulent shear flow, turbulent channel's pipe flow, turbulent boundary layers.

ES 581 SPECIAL TOPICS: RADIATION TRANSPORT (3)
SEC. 002 (Same as AE/ME 599 Sec. 003)
TIME: Tuesday & Friday 10:45 – 12:00 F252
TEXT: Thermal Radiation Heat Transfer; Robert Siegel and John R. Howell; Taylor and Francis;
4th Edition; ISBN# 1-56032-839-8.
PROFESSOR: Dr. Trevor Moeller

Supplemental Text: Maher I. Boulos, Pierre Fauchais, and Emil Pfender, Thermal Plasmas: Fundamentals and Applications; Vol. 1; Plenum Press; ISBN # 0-306-44607-3.

This course will cover fundamental radiation processes that occur in absorbing, emitting, and radiating media (plasmas and high temperature gases). Topics will include: blackbody radiation concepts, fundamentals of radiation in matter, classical radiation, quantum theory of radiation, line broadening, continuum radiation, equilibrium relations, and an introduction to spectral diagnostics of plasmas.

ES 595 SEMINARS: ENGINEERING SCIENCE (1)
SEC. 002 Dr. Ahmad Vakili

Seminars in all phases of Engineering Science, reports on current research at UTK and UTSI.
May be repeated.

ES 600 DOCTORAL & RESEARCH DISSERTATION (1 – 15)
SEC. 004 Antar
006 Majdalani
007 Steinhoff
008 Moeller

*ES 651 ADVANCED TOPICS IN COMPUTATIONAL FLUID DYNAMICS (3) **CANCELLED**
SEC. 001 (Same as AE 661/ME 651)
TIME: Tuesday & Friday 10:45 – 12:00 E210
TEXT: TBD
PROFESSOR: Dr. John Steinhoff

Modern approximation theory for Euler and Navier-Stokes conservation systems, compressible flow, hyperbolic forms, boundary conditions. Weak forms, extremization, finite element/finite volume/flux vector discrete implementations, a priori error estimates, accuracy, convergence, stability. Numerical linear algebra, approximate factorization, sparse matrix methods. Dissipation, Fourier spectral analysis, smooth and non-smooth solutions. (*Same as Aerospace Engineering 661; Mechanical Engineering 651.*)

ES 681 ADVANCED TOPICS IN ENGINEERING MECHANICS: LINEAR AND
NONLINEAR WAVES (3)
SEC. 001 (Cross-listed as AE 690 Section 002)
TIME: Monday & Thursday 4:15 – 5:30 B210
TEXT: GB. Witham: Linear and Nonlinear Waves
P.C. Drazin & R.S. Johnson: Solitons: An Introduction; ISBN# 0521336554
PROFESSOR: Dr. John Steinhoff

The basic properties of many important physical phenomena can often be modeled by partial differential equations with simple nonlinear terms. These range from pattern formation in water waves to predator-prey dynamics and optical pulse propagation in fibers. Representative classes of equations will be studied and their solutions characterized. An important sub-topic will be solitary waves and especially solitons. Solitons have recently been extensively studied as very important and interesting solutions of many nonlinear partial differential equations: they propagate without changing shape, even after interacting with each other, they are represented in many important physical phenomena, from optical pulses to tidal bores, and are studied as models of elementary particles. The course will consist of a survey of the field followed by a study of the methods of solving nonlinear partial differential equations which lead to soliton solutions. The emphases will be on physical arguments and analysis. *Prerequisite: include Elementary Partial Differential Equations and Advanced Calculus.*

ENGINEERING MANAGEMENT

EM 501 CAPSTONE PROJECT (3 - 6)
SEC. 001 Dr. Gregory Sedrick
SEC. 002 Dr. Denise Jackson

Application-oriented project to show competence in major academic area. Enrollment limited to Engineering Management students in non-thesis program. May be repeated. Maximum 6 hours.

EM 502 REGISTRATION FOR USE OF FACILITIES (1 – 15)
SEC. 001 Dr. Gregory Sedrick
SEC. 002 Dr. Denise Jackson

Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before a degree in Industrial Engineering (Engineering Management) is completed. May not be used toward degree requirements.

EM 533 THEORY AND PRACTICE OF ENGINEERING MANAGEMENT (3)
SEC. 001 UTSI Students participating at Tullahoma or Oak Ridge
SEC. 002 UTSI Students participating elsewhere
SEC. 003 UTK Students participating at Knoxville DE Classrooms
SEC. 004 UTK Students participating elsewhere
TEXT: http://www.utsi.edu/academics/ieandem/student_services.htm
TIME: Thursday 4:00 – 6:35 E113
PROFESSOR: Dr. Gregory Sedrick

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 (3)
SEC. 001 UTSI Students participating at Tullahoma or Oak Ridge
SEC. 002 UTSI Students participating elsewhere
SEC. 003 UTK Students participating at Knoxville DE Classrooms
SEC. 004 UTK Students participating elsewhere
TIME: Tuesday 4:00 – 6:35 E113
TEXT: Go to http://www.utsi.edu/academics/ieandem/student_services.htm
PROFESSOR: Dr. Gregory Sedrick

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 541 MANAGING CHANGE AND IMPROVEMENT IN
TECHNICAL ORGANIZATIONS (3)
SEC. 001 UTSI Students participating at Tullahoma or Oak Ridge
SEC. 002 UTSI Students participating elsewhere
SEC. 003 UTK Students participating at Knoxville DE Classrooms
SEC. 004 UTK Students participating elsewhere

TIME: Monday 4:00 – 6:35 E113
PROFESSOR: Dr. Denise Jackson

Current topics, theories, and applications for managing change and innovation of performance improvement in organizations. Multi-initiative approaches: quality management, organizational effectiveness, employee empowerment, performance measurement, and application of statistical tools and techniques. Self-assessment for performance excellence. Change agent, team building, and leadership issues. Case studies.

EM 595 SPECIAL TOPICS IN ENGINEERING MANAGEMENT (3)
SEC. 001 Sedrick

EM 691 ADVANCED TOPICS IN ENGINEERING MANAGEMENT (3)
SEC. 001 Sedrick

INDUSTRIAL ENGINEERING

IE 500 THESIS (1-15)
SEC. 002 Dr. Denise Jackson as main advisor
SEC. 006 Dr. Gregory Sedrick as main advisor

IE 514 ADVANCED INFORMATION SYSTEMS ANALYSIS (3)
SEC. 001 All Students participating at Knoxville
SEC. 002 UTK Students participating elsewhere
SEC. 003 UTSI Students participating at Tullahoma or Oak Ridge
SEC. 004 UTSI Students participating elsewhere

TIME: CENTRA

TEXT: http://www.utsi.edu/academics/ieandem/student_services.htm

PROFESSOR: Dr. Xueping Li

Systems analysis and systems control concepts applied to systems of information. Role of IE in office and factory of future. Management support systems, decision support systems, and integrated support systems.

IE 518 ADVANCED ENGINEERING ECONOMIC ANALYSIS (3)
SEC. 001 UTK Students participating at Knoxville DE Classrooms
SEC. 002 UTK Students participating elsewhere
SEC. 003 UTSI Students participating at Tullahoma or Oak Ridge
SEC. 004 UTSI Students participating elsewhere

TIME: Wednesday 4:00 – 6:35 E113

TEXT: http://www.utsi.edu/academics/ieandem/student_services.htm

PROFESSOR: Dr. Joseph Wilck

Application of engineering economic analysis in complex decision situations. Inflation and price changes; uncertainty evaluation using non-probabilistic techniques; capital financing and project allocation; evaluations involving equipment replacement, investor-owned utilities, and public works projects; probabilistic risk analysis including computer simulation and decision trees; multi-attribute decision analysis; and other advanced topics. *Prerequisite: EM537 OR both Engineering Economy (IIE405 or equivalent) and Probability and Statistics for Scientists and Engineers, (IIE205 or equivalent).*

IE 522 OPTIMIZATION METHODS IN INDUSTRIAL ENGINEERING (3)
SEC. 001 All Students participating at Knoxville
SEC. 002 UTK Students participating elsewhere
SEC. 003 UTSI Students participating at Tullahoma or Oak Ridge
SEC. 004 UTSI Students participating elsewhere
TIME: CENTRA
TEXT: http://www.utsi.edu/academics/ieandem/student_services.htm
PROFESSOR: Dr. Charles Aiken

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

IE 527 LEAN PRODUCTION SYSTEMS (3)
SEC. 001 All Students participating at Knoxville
SEC. 002 UTK Students participating elsewhere
SEC. 003 UTSI Students participating at Tullahoma or Oak Ridge
SEC. 004 UTSI Students participating elsewhere
TIME: CENTRA
TEXT: http://www.utsi.edu/academics/ieandem/student_services.htm
PROFESSOR: Dr. Rupey Sawhney

Characteristics and performance of mass and lean production systems. Lean production concepts and principles. Planning, designing and implementing lean production systems: line balancing, set-up time reduction, cost management, maintenance support and other selected topics. Application at enterprise level to achieve strategic competitive goals. *Prerequisite: 515 or consent of instructor.*

IE 529 APPLICATION OF LINEAR ALGEBRA IN ENGINEERING SYSTEMS (3)
SEC. 001 (Video Recorded) (Same as CBE/ECE/MSE/ME 529)
TITLE: Advanced Linear Algebra for Engineers with MATLAB; Sohal A. Dianat and Eli S. Saber; CRC Press, Taylor and Francis Group, 2009; ISBN-13: 978-1-4200-9524-4 (Hardcover); ISBN-10: 1420095234; List Price: \$99.95.
TIME: Monday & Thursday 9:45 – 11:00 E113
PROFESSOR: 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. *(Same as Biomedical Engineering 529; Industrial Engineering 529; Materials Science and Engineering 529; Mechanical Engineering 529).* *Comment(s): Graduate standing or consent of instructor required.*

Comments: Methods of linear algebra as applied to engineering. Topics to be covered include: systems of linear equations, matrices, solutions of linear equations, Gaussian elimination, vector spaces, linear transformations, orthogonality, least-squares approximations, determinants, eigenvalues and eigenvectors, positive definite matrices, singular value decomposition, and numerical computational methods. Course assignments will consist of pencil-and-paper exercises

and numerical exercises involving MATLAB. Students registering for this course are assumed to have access to at least the Student Edition of MATLAB.

IE 592 SPECIAL TOPICS IN INDUSTRIAL ENGINEERING (1-3)
SEC. 002 Sedrick

IE 600 DOCTORAL RESEARCH/DISSERTATION (3-15)
SEC. 002 Jackson
SEC. 006 Sedrick

*IE 691 ADVANCED TOPICS IN INDUSTRIAL ENGINEERING (3) **CANCELLED**
SEC. 002 Sedrick

*IE 692 ADVANCED TOPICS IN INDUSTRIAL ENGINEERING (3) **CANCELLED**
SEC. 001 Sedrick

MATERIALS SCIENCE

MSE 405 STRUCTURAL CHARACTERIZATION OF MATERIALS (4)
SEC. 002
TIME: Tuesday & Friday 1:00 – 2:30 CLA Conference Room
TEXT: TBD
PROFESSOR: Dr. William Hofmeister and Dr. George Murray

X-ray diffraction, fluorescence, scanning and transmission electron microscopy; secondary ion mass spectroscopy, microanalytical techniques, tribology, hardness and tensile testing. Class plus laboratory exercises.

MSE 500 THESIS (1 – 15)
SEC. 002 Dr. William Hofmeister
SEC. 004 Dr. George Murray
SEC. 005 Dr. Jackie Johnson

MSE 503 GRADUATE SEMINAR IN MATERIALS SCIENCE & ENGINEERING (1)
SEC. 002
TIME: Wednesday 3:00 CLA Conference Room
PROFESSOR: Dr. Zhongren Yue

Theme: Biomimetic materials.

MSE 529 APPLICATION OF LINEAR ALGEBRA IN ENGINEERING SYSTEMS (3)
SEC. 001 (Video Recorded) (Same as CBE/ECE/IE/ME 529)
TITLE: Advanced Linear Algebra for Engineers with MATLAB; Sohal A. Dianat and Eli S. Saber; CRC Press, Taylor and Francis Group, 2009; ISBN-13: 978-1-4200-9524-4 (Hardcover); ISBN-10: 1420095234; List Price: \$99.95.
TIME: Monday & Thursday 9:45 – 11:00 E113
PROFESSOR: 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. (*Same as Biomedical Engineering 529; Industrial Engineering 529; Materials Science and Engineering 529; Mechanical Engineering 529*). *Comment(s): Graduate standing or consent of instructor required.*

Comments: Methods of linear algebra as applied to engineering. Topics to be covered include: systems of linear equations, matrices, solutions of linear equations, Gaussian elimination, vector spaces, linear transformations, orthogonality, least-squares approximations, determinants, eigenvalues and eigenvectors, positive definite matrices, singular value decomposition, and numerical computational methods. Course assignments will consist of pencil-and-paper exercises and numerical exercises involving MATLAB. Students registering for this course are assumed to have access to at least the Student Edition of MATLAB.

MSE 578 ADVANCED BIOMATERIALS: BIOLOGICAL APPLICATIONS OF NANOMATERIALS (3)

SEC. 006

TIME: Tuesday & Thursday 2:30 – 3:45 F252

TEXT: TBD

PROFESSOR: Dr. Jackie Johnson

Focuses on the biological/medical uses of nonoscale 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 nonomaterials and nano-bio interfaces. Biological and biomedical application of nanomaterials. (*Cross-listed: Same as Biomedical Engineering 578*).

MSE 600 DIRECT DOCTORAL DISSERTATION (1-15)

SEC. 002 Dr. William Hofmeister

SEC. 003 Dr. Jackie Johnson

MATHEMATICS

*MATH 431 DIFFERENTIAL EQUATIONS II (3) **CANCELLED**

SEC. 001

TIME: Tuesday & Friday 2:30 – 3:45 B112

TEXT: Class Notes

PROFESSOR: Dr. T. H. Moulden

First order equations. The matrix eigenvalue problem and systems of first order linear equations. Solution in series, Laplace transforms and Green's functions.

MATH 435 PARTIAL DIFFERENTIAL EQUATIONS (3)

SEC. 002 (Video Recorded)

TIME: Tuesday & Friday 10:30 – 11:45 E111

TEXT: Richard Haberman: Applied Partial Differential Equations with Fourier Series and Boundary Value Problems;

Prentice Hall; 4th Ed., ISBN# 013-065243-1

PROFESSOR: Dr. Kenneth Kimble

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

Prerequisite: Differential Equations and Calculus III.

***MATH 453 MATRIX ALGEBRA II (3) CANCELLED**

SEC. 001

TEXT: Linear Algebra and It's Applications: G. Strang; Brooks and Cole; 4 Ed.; ISBN: 10-0030105676; ISBN: 13-978-0030105678.

TIME: TBD

PROFESSOR: TBD

Advanced topics in matrix theory including Jordan canonical form. *Prerequisite(s): 251 or 257.*

MATH 472 NUMERICAL LINEAR ALGEBRA (3)

SEC. 001 (Video Recorded) (Same as CS 472)

TEXT: Burden & Faires: Numerical Analysis; 8th Ed., Brooks/Cole; ISBN: 0-534-38216-9

TIME: Monday & Wednesday 2:30 – 3:45 E111

PROFESSOR: Dr. Trevor Moulden

Direct and iterative methods for systems of linear equations. Solution of single nonlinear equations and nonlinear systems. Orthogonal decomposition, least squares and algebraic eigenvalue problem. *Prerequisite: Numerical Algorithms 1 or consent of instructor. Recommended prerequisite: 453.*

MATH 472 NUMERICAL LINEAR ALGEBRA (3)

SEC. 003 AEDC On-Base Students

TEXT: Burden & Faires: Numerical Analysis; 8th Ed., Brooks/Cole; ISBN: 0-534-38216-9

TIME: Tuesday & Friday 8:00 – 9:15 AEDC Small DO Conference Room

PROFESSOR: Dr. Chad Limbaugh

Direct and iterative methods for systems of linear equations. Solution of single nonlinear equations and nonlinear systems. Orthogonal decomposition, least squares and algebraic eigenvalue problem. *Prerequisite: Numerical Algorithms 1 or consent of instructor. Recommended prerequisite: 453.*

MATH 500 MASTER'S THESIS (1 - 15)

SEC. 002 Dr. Boris Kupershmidt

SEC. 003 Dr. K.C. Reddy

MATH 519 SEMINAR IN APPLIED MATHEMATICS (1-3)

SEC. 002

TEXT: Notes provided by Instructor

TIME: Monday & Thursday 9:15 – 10:30 B210

PROFESSOR: Dr. Boris Kupershmidt

Repeatability: May be repeated. Maximum 12 hours.

***MATH 578 NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS (3) CANCELLED**

SEC. 001

TIME: Monday & Thursday 1:00 – 2:15 F252

TEXT: TBD

PROFESSOR: Dr. Christian Parigger

Numerical approximation of solutions of partial differential equations including conservation laws and hyperbolic, parabolic, and elliptic problems. Derivation, physical meaning, and implementation of schemes. *Recommended Background: A course in partial differential equations or 512 or 515, and familiarity with an operating system and a programming language.*

MATH 593 INDEPENDENT STUDY (1-12)
SEC. 002 Dr. Boris Kupershmidt

MECHANICAL ENGINEERING

ME 500 MASTER'S THESIS (1 - 15)
SEC. 001 Schulz
021 Antar
022 Flandro
023 Majdalani
024 Moeller
025 Steinhoff
026 Vakili

ME 512 HEAT TRANSFER II (3)
SEC. 001
TIME: Tuesday & Friday 1:00 – 2:30 E113
TEXT: Adrain Bejan: Convection Heat Transfer; 2nd Ed., John Wiley & Sons,
ISBN# 0471579726
PROFESSOR: Dr. Basil Antar

This course is a continuation of heat transfer, covering convection and thermal radiation heat transfer. *Prerequisite: Mechanical Engineering 511 or consent of instructor.*

ME 522 THERMODYNAMICS II (3)
SEC. 001
TEXT: Richard E. Sonntag, Clalus Borgnakke, and Gorgon J. Van Wylen, Fundamentals of Thermodynamics, 6th Ed., John Wiley & Sons, Inc., 2003, ISBN 0-471-15232-3
TIME: Wednesday & Friday 8:30 – 9:45 E113
PROFESSOR: Dr. Robert McAmis

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, Schrodinger equation. *Prerequisites: 332.*

ME 529 APPLICATION OF LINEAR ALGEBRA IN ENGINEERING SYSTEMS (3)
SEC. 001 (Video Recorded) (Same as CBE/ECE/IE/MSE 529)
TITLE: Advanced Linear Algebra for Engineers with MATLAB; Sohal A. Dianat and Eli S. Saber; CRC Press, Taylor and Francis Group, 2009; ISBN-13: 978-1-4200-9524-4 (Hardcover); ISBN-10: 1420095234; List Price: \$99.95.
TIME: Monday & Thursday 9:45 – 11:00 E113
PROFESSOR: 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. (*Same as Biomedical Engineering 529; Industrial Engineering 529; Materials Science and Engineering 529; Mechanical Engineering 529*). *Comment(s): Graduate standing or consent of instructor required.*

Comments: Methods of linear algebra as applied to engineering. Topics to be covered include: systems of linear equations, matrices, solutions of linear equations, Gaussian elimination, vector spaces, linear transformations, orthogonality, least-squares approximations, determinants, eigenvalues and eigenvectors, positive definite matrices, singular value decomposition, and numerical computational methods. Course assignments will consist of pencil-and-paper exercises and numerical exercises involving MATLAB. Students registering for this course are assumed to have access to at least the Student Edition of MATLAB.

ME 539 CONTINUUM MECHANICS (3)
SEC. 002 (Same as ES 539/AE 539)
TIME: Monday & Thursday 9:15 – 10:30 B112
TEXT: L. E. Malvern: Introduction to the Mechanics of a Continuous Medium; Prentice Hall, ISBN# 13 487603 2
PROFESSOR: Dr. T. H. Moulden

Cartesian tensors, transformation laws, basic continuum mechanics, concepts; stress, strain, deformation, constitutive equations. Conservation laws for mass, momentum, energy. Applications in solid and fluid mechanics. *Same as Engineering Science and Aerospace Engineering 539.*

ME 542 FLUID MECHANICS II (3)
SEC. 001 (Same as AE 542/ES 542)
TIME: Tuesday & Friday 9:15 – 10:30 E211
TEXT: 1. H. Tennekes & J. Lumley: A First Course in Turbulence, MIT, Latest Ed.
2. R.L. Panton: Incompressible Flow; Wiley Interscience; Latest publications
PROFESSOR: Dr. Basil Antar

Inviscid flows, boundary layers, laminar jets, wakes and shear layers. Transition to turbulence. Turbulent flow, Reynolds averaged equations, dynamics of turbulence, boundary free turbulent shear flow, turbulent channel's pipe flow, and turbulent boundary layers.

ME 581 SPECIAL TOPICS IN AE: ROCKET PROPULSION I (3)
SEC. 001 (Video Recorded) (Same as ME 599 Sec. 004)
TEXT: Rocket Propulsion Elements; George P. and Biblarz, Oscar; Wiley; 7th Edition; ISBN# 041326429.
TIME: Wednesdays 4:00 – 6:35 E111
PROFESSOR: Dr. Joseph Majdalani

Rocket propulsion fundamentals; thermodynamics of non-reacting and chemically reacting ideal gases, rocket nozzle design; ideal rocket performance parameters; rocket heat transfer; chemistry of propellants; liquid rocket engine systems; ground testing; introduction to solid propellant rockets.

***ME 582 ROCKET PROPULSION II (3) CANCELLED**
SEC. 001
TIME: Monday & Thursday 10:45 – 12:00 E211
TEXT: Physics of Electric Propulsion; Robert Jahn (available on amazon.com).
PROFESSOR: 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.

***ME 585 TURBOMACHINERY SYSTEMS II (3) CANCELLED**
SEC. 001 (Video Recorded)
TIME: Tuesday & Thursday 4:00 – 5:15 E111
TEXT: Jack D. Mattingly: Elements of Gas Turbine Propulsion; 1st Ed., AIAA Educator Series; ISBN# 1-56347-778-5
PROFESSOR: Dr. Milt Davis

The course will provide an in-depth analysis of component performance for compressors, turbines, nozzles, inlets, combustors. Compressor and turbine analysis will include: the Euler turbomachinery equation, velocity triangles, degree of reaction, blade performance and efficiency, and stage loading. Axial and centrifugal turbomachines will be analyzed. Combustors and augments performance will be studied. Inlet and nozzle performance will be analyzed and their integration with the full gas turbine engine will be studied. The course will emphasize the use of numerical simulations as tools for use in analyzing gas turbine engine/component performance.

ME 590 SELECTED ENGINEERING PROBLEMS (2-6)
***SEC. 001 Dr. Montgomery Smith CANCELLED**
SEC 003 Dr. Basil Antar

ME 595 SEMINARS: AEROSPACE & MECHANICAL SYSTEMS (1)
SEC. 001 Dr. Ahmad Vakili (Same as AE 595)

Seminars in all phases of Mechanical Engineering, reports on current research at UTK and UTSI. May be repeated.

ME 599 SPECIAL TOPICS: RADIATION TRANSPORT (3)
SEC. 003 (Same as AE 599 Sec. 003/ES 581 Sec. 002)
TIME: Tuesday & Friday 10:45 – 12:00 F252
TEXT: Thermal Radiation Heat Transfer; Robert Siegel and John R. Howell; Taylor and Francis; 4th Edition; ISBN# 1-56032-839-8.
PROFESSOR: Dr. Trevor Moeller

Supplemental Text: Maher I. Boulos, Pierre Fauchais, and Emil Pfender, Thermal Plasmas: Fundamentals and Applications; Vol. 1; Plenum Press; ISBN # 0-306-44607-3.

This course will cover fundamental radiation processes that occur in absorbing, emitting, and radiating media (plasmas and high temperature gases). Topics will include: blackbody radiation concepts, fundamentals of radiation in matter, classical radiation, quantum theory of radiation, line broadening, continuum radiation, equilibrium relations, and an introduction to spectral diagnostics of plasmas.

ME 600 DOCTORAL and RESEARCH DISSERTATION (3 - 15)
 SEC. 016 Antar
 017 Majdalani
 021 Steinhoff
 022 Moeller
 031 Vakili

*ME 651 ADVANCED TOPICS IN COMPUTATIONAL FLUID DYNAMICS (3) **CANCELLED**
 SEC. 001 (Same as AE 661/ES 651)
 TIME: Tuesday & Friday 10:45 – 12:00 E210
 TEXT: TBD
 PROFESSOR: Dr. John Steinhoff

Modern approximation theory for Euler and Navier-Stokes conservation systems, compressible flow, hyperbolic forms, boundary conditions. Weak forms, extremization, finite element/finite volume/flux vector discrete implementations, a priori error estimates, accuracy, convergence, stability. Numerical linear algebra, approximate factorization, sparse matrix methods. Dissipation, Fourier spectral analysis, smooth and non-smooth solutions. (*Same as Aerospace Engineering 661; Engineering Science 651.*)

PHYSICS

PHYS 500 MASTER’S THESIS (1 - 15)
 SEC. 002 Crater
 003 Lewis
 004 Davis
 005 Parigger
 006 Chen
 007 McGregor

PHYS 503 PHYSICS COLLOQUIUM (1)
 SEC. 002
 TIME: Thursday 3:30 – 5:00 B210
 PROFESSOR: Dr. Horace Crater

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

PHYS 512 THEORETICAL PHYSICS II (3)
 SEC. 002 (Video Record)
 TIME: Monday & Thursday 11:15 – 12:30 E113
 PROFESSOR: Dr. Horace Crater

Concepts and applications in applied physics. Topics: electrostatic and magneto-static problems, EM waves, duality and quantization, absorption and emission, statistical ensemble and thermal

equilibrium, and other modern applications of current interest, in areas of quantum chemistry, biophysics, optics, spectroscopy and astrophysics. *Recommended Background: Familiarity with computational methods.*

***PHYS 514 PROBLEMS IN THEORETICAL PHYSICS II (4) CANCELLED**

SEC. 002 (Interactive Transmission from Knoxville)

TIME: Wednesday 10:15 – 11:15 E113

TEXT: Core Concepts in Physics

PROFESSOR: Dr. Marianne Breinig

A course in Calculus based physics with 135, satisfies prerequisite for 200 level and beyond. Alternative to honors Physics 137–138 for physics majors. 3 hours lecture, 2 hours lab. *Coreq: Mathematics 141-142.*

PHYS 522 QUANTUM MECHANICS (3)

SEC. 002

TIME: Monday & Thursday 11:30 – 12:45 F252

TEXT: Sakurai: Quantum Mechanics; Franz Schwabl; Springer; 4th (2007) for Fall 2009; 4th (2008) for Spring 2010; ISBN # 978-540-71932-8 (Fall 2009) and 978-3-540-85061-8 (Spring 2010).

PROFESSOR: Dr. Christian Parigger

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

The course syllabus (lecture series and exercises) is designed to be attractive for pure and applied Science students. References to classical “Quantum Mechanics” texts such as Sakurai, Cohen-Tannoudji *et al.*, and Greiner’s books “Quantum Mechanics, An Introduction” and “Quantum Mechanics, Special Chapters” will be made. This course is part I of a two-part course series, recommended to be taken in sequence. The above description of the course covers both 521 and 522, although for the spring 522 “Quantum Mechanics,” Schwabl’s “Advanced Quantum Mechanics” book, 4-th edition (2008) will also be used. For fall2009 and spring2010, UT’s electronic “blackboard” will be used.

***PHYS 551 STATISTICAL MECHANICS (3) DEFERRED TO FALL 2010**

SEC. 001

TEXT: TBD

TIME: Tuesday & Friday 9:15 – 10:30 F252

PROFESSOR: Dr. Christian Parigger

TEXT: Main course book: "Thermodynamics and Statistical Mechanics" by W Greiner, L. Neise, H. Stoecker, ISBN 0-387-94299-8. Also, Lecture notes, with references to classical books such as D. McQuarrie "Statistical Mechanics"(ISBN 1891389157), H. Callen "Thermodynamics and Introduction to Thermostatistics"(ISBN 0-471-86256-8), L Reichl, " A modern Course in Statistical Physics" (ISBN 0-471-59520-9), and references to selected on-line texts, e.g., see <http://www-fl1.ijs.si/~vilfan/SM/> and/or a collection of texts at <http://sites.google.com/site/jeanrenehazottes/data-base-1/books-and-lecture-notes/statistical-physics>

Ergodic theory, classical ensemble theory, quantum mechanical ensembles, relation of statistical mechanics to thermodynamics, transport theory and approach to equilibrium, phase transition, fluctuations and correlations. *Prerequisite(s): 521, 531, and 571.*

PHYS 573 NUMERICAL METHODS IN PHYSICS (3)

SEC. 002

TIME: Monday & Thursday 9:15 – 10:30 F252

TEXT: Survey of Computational Physics; Rubin Landau et al.; Princeton, (to appear in Summer 2008); Numerical Recipes, The Art of Scientific Computing; THIRD EDITION; W. H. Press et al., ISBN 978-0521-88068-8, (online version January 2008); and selected other references and example codes, e.g., Schmid et al, Theoretical Physics on the Personal Computer, Springer, 1990, including references to computer languages such as FORTRAN, C, C++, Java, and/or implementations of software packages/libraries. Focus of 573 will be the former sections of the Landau et al book (<http://press.princeton.edu/titles/8704.html>) and the Num. Recipes book.

PROFESSOR: Dr. Christian Parigger

Numerical methods for solution of physical problems, use of digital computers, analysis of errors. *Prerequisite: 571 or consent of instructor.*

COMMENT: This is a course recognized for the new interdisciplinary graduate minor program in computational science: <http://igmcs.utk.edu>.

*PHYS 599 SEMINAR IN MODERN PHYSICS: SINGLE-MOLECULE SPECTROSCOPY (3) **CANCELLED**

SEC. 006

TIME: Tuesday & Friday 10:45 – 12:00 F253

TEXT: TBD

PROFESSOR: Dr. Lloyd Davis

Seminar discussions on assigned readings from the literature on single-molecule spectroscopy.

PHYS 599 SEMINAR IN MODERN PHYSICS: OCULAR SCIENCE AND INSTRUMENTATION (3)

SEC. 007

TIME: Monday & Thursday 9:15 – 10:30 F253

TEXT: TBD

PROFESSOR: Dr. Ying Ling Ann Chen

Repeatability: May be repeated with consent of department. Maximum 18 hours.

PHYS 599 SEMINAR IN MODERN PHYSICS: GENERAL RELATIVITY (1-3)

SEC. 008

TIME: Monday & Thursday 9:15 – 10:30 B210

TEXT: TBD

PROFESSOR: Dr. Horace Crater

This course will explore an approach to Einstein's general relativity developed by the physicist Mendel Sachs. His approach utilizes quaternions and incorporates in one set of equations, the Einstein equations of General Relativity and the Maxwell equations of Electromagnetism. His unified field theory is in the spirit of that which Einstein sought through most of the later part of his life. The equations of Sachs' unified theory are nonlinear, just as with the Einstein equations. In the limit of small space curvature though, the quaternionic structure of the associated matter field equations leads to linear equations identical in form to those of quantum mechanics. The

approach to be taken in this course will be to develop the main aspects of the older Einstein tensor formalism and in parallel develop the approach of Sachs. No previous course in general relativity is required. *Repeatability: May be repeated with consent of department. Maximum 18 hours.*

PHYS 600 DOCTORAL & RESEARCH DISSERTATION (3 - 15)
 SEC. 002 Crater
 003 Lewis
 004 Davis
 005 Parigger
 006 Chen

PHYS 606 NONLINEAR OPTICS (3)
 SEC. 001 (Interactive Video)
 TIME: Tuesday & Thursday 8:15 – 9:30 E113
 TEXT: TBD
 PROFESSOR: Dr. Lloyd Davis

Nonlinear optical susceptibilities, wave propagation in nonlinear media, sum-frequency and difference frequency generation, harmonic generation, parametric amplification and oscillation, stimulated Raman processes, two-and multi-photon processes, four-wave mixing and phase conjugation, transient coherent optical effects and free induction decay, optical breakdown and nonlinear effects in plasmas. *Prerequisites: 521*

***PHYS 611 ADVANCED QUANTUM MECHANICS AND FIELD THEORY (3) DEFERRED TO FALL 2010**
 SEC. 001

TEXT: Advanced books on Quantum Mechanics including Schwabl; Advanced Quantum Mechanics, Third Edition; Springer 2005; Schwabl, Quantum Mechanics, 4th edition, Springer 2007 and classic references such as Bransden and Joachain; Physics of Atoms and Molecules; Benjamin Cummings; 2003 (2nd Edition); and/or Sakurai and Cohen Tannoudji, and on-line references, including references to Quantum Electrodynamics.
 TIME: Monday & Thursday 9:15 – 10:30 F252
 PROFESSOR: Dr. Christian Parigger

Survey of problems and methods. Topics of current interest. *Comment(s): Intended for all graduate students.*

PHYS 642 ADVANCED TOPICS IN MODERN PHYSICS (3)
 SEC. 001
 TEXT: TBD
 TIME: Tuesday & Friday 10:45 – 12:00 F253
 PROFESSOR: Dr. Lloyd Davis

Advanced theoretical or experimental topics not covered in other courses. *Repeatability: May be requested with consent of department. Maximum 9 hours.*

***PHYS 671 ADVANCED SOLID STATE PHYSICS (3) DEFERRED TO SPRING 2011**
 SEC. 001

TEXT: Electrical Transport in Nanoscale Systems; Massimiliano Di Ventra; Cambridge 2008; and classic Solid State Physics references, e.g. Kittel, Solid State Physics, 8th ed, Wiley 2005, including references to sections of Greiner, Quantum Electrodynamics, Springer 2003, and on-line references.
 TIME: Tuesday & Friday 10:45 – 12:00 E211
 PROFESSOR: Dr. Christian Parigger

Survey of research problems and methods. Topics of current interest. *Comment(s): Intended for all graduate students.*

STATISTICS

STAT 251 PROBABILITY AND STATISTICS (3) **CANCELLED**
SEC. 002 (Video Recorded)
TEXT: TBD
TIME: Tuesday & Friday 8:45 – 10:00 E111
PROFESSOR: Dr. K.C. Reddy

Probability, discrete and continuous random variables. Expectation, variance, and covariance. Binomial, poisson, hypergeometric, normal, exponential, and gamma models. Sampling distributions. Central Limit Theorem. Estimation, confidence intervals and hypothesis testing.
Preq: or Coreq: Math 241.



Spring 2010



*Registration
Announcement*

**The University of Tennessee
Space Institute**

**411 B.H. Goethert Parkway
Tullahoma, TN 37388-9700
888-822-8874 x-37228**

www.utsi.edu

**See Inside for Online Registration Instructions
<https://cpo.utk.edu/CPOWeb>**