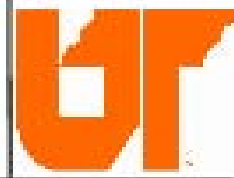


THE UNIVERSITY of
TENNESSEE



Space Institute



Registration Announcement

411 B.H. Geothert Parkway
Tullahoma, TN 37388-9700
888-822-8874 x228

www.utsi.edu



See Inside for Online Registration Instructions

<https://cpo.utk.edu/CPOWeb>

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CALENDAR --- 2009 SPRING SEMESTER

Priority Registration.....	September 29, 2008 – January 2, 2009
Admission to Candidacy Forms for Spring 2009 Commencement	December 2, 2008
Spring 2009 Graduation Application Deadline	December 2, 2008
University Closed, but CPO.UTK.EDU is available	December 22 – 26, 2008
Late Registration and late fees begin	January 3 – January, 16, 2009
Classes begin.....	January 7, 2009
Last Day to Late Register, Add, Change Grading Options or Drop Without a “W”	January 16, 2009
Martin Luther King Holiday	January 19, 2009
Last day to add/change credit with signatures	February 17, 2009
Graduation Fee Payment Deadline (MS \$30, PhD \$75).....	March 6, 2009
Preliminary Thesis/Dissertation Review Deadline	March 6, 2009
Last day to schedule final exam (thesis)	March 13, 2009
Last day to schedule final exam (non-thesis/capstone students).....	March 13, 2009
Spring Break (No Classes).....	March 16-20, 2009
Last day to schedule final exam (dissertation).....	March 27, 2009
Purchase cap and gown and order hood.....	March 30, 2009
Register to attend the Graduate Hooding Ceremony (http://gradschool.utk.edu)	March 30, 2009
Drop with a “W”	March 31, 2009
Last day to take final exam (thesis/dissertation students).....	April 3, 2009
Last day to take final exam (non-thesis/capstone students).....	April 3, 2009
Spring Recess (No Classes)	April 10, 2009
Electronic Thesis/Dissertation due in Knoxville (5:00 P.M. EST).....	April 17, 2009
Submit report of final examination (Pass/Fail) form	April 17, 2009
Deadline for Submission of Admission to Candidacy for students Graduating Summer 2009 and Graduation Application.....	April 24, 2009
Deadline for removing "INCOMPLETE" grades	April 24, 2009
Classes End	April 24, 2009
Total Withdraw from the University Deadline	April 24, 2009
Study Period.....	April 25, 26, 27, 2009
Exam Period.....	April 28, 29, 30, 2009
Graduate Hooding Ceremony (UTK)	May 7, 2009
COMMENCEMENT (UTK)	May 8, 2009
Second thesis/dissertation deadline (Student will receive diploma August 2009 but do not have to register for Summer 2009) (Defense Completed by April 24) ...	May 22, 2009

SUMMER SEMESTER 2009

Priority Registration for Summer Semester 2009 UTSI begins.....	TBD
Final Registration for UTSI students	TBD
Memorial Day Holiday	May 25, 2009
Classes begin.....	June 1, 2009
July 4 th Holiday	July 3, 2009
Classes End	August 6, 2009
Summer Graduation Date on Transcript (No Ceremony).....	August 14, 2009

**SPRING SEMESTER 2009
FINAL STUDY DAY AND EXAM SCHEDULE**

LAST DAY OF CLASSES.....April 24, 2009

STUDY PERIODApril 25, 26, 27, 2009

FINAL EXAMS 2009

REGULAR CLASS TIME	(Same Classroom)	EXAM TIME
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1st Day - Tuesday, April 28, 2009

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

2nd Day – Wednesday, April 29, 2009

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, April 30, 2009

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 2009**

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 2009 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 29, 2008 – January 2, 2009. Late registration will be January 3, 2009. Classes begin Thursday, January 7, 2009.

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 2009

Last Registration Day for Receiving Statements by Mail	December 5, 2008
Statement Information Available on CPO	December 8, 2008
Priority Registration Payment/Confirmation Deadline	January 2, 2009 (3:30 pm CST)
Late Registration/Late Fees Begin	January 3, 2009
Late Payment and Confirmation Deadline	January 16, 2009 (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 297 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)-432
Bookstore:	1-888-822-UTSI (8874)-204
Business Office:	1-888-822-UTSI (8874)-204
Registrar's Office:	1-888-822-UTSI (8874)-228

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. 204 or 314 or by email Robin Nee at rnee@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, A102, 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, A104, Mail Stop 5, UTSI, Tullahoma, TN 37388-9700.

PAYMENT OF FEES

Payment of fees is due at time of registration. Late fees will begin on January 3, 2009. 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.	Gregory Sedrick	931-393-7292	gshedrick@utsi.edu

TUITION AND/OR MAINTENANCE FEES*

Full Fees For In-State Students (per semester)

Maintenance Fee	\$3,131.00*
Programs and Services Fee	90.00
Total	\$3,221.00

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

Maintenance Fee	\$3,131.00*
Programs and Services Fee	90.00
Tuition	\$6,329.00*
Total	\$9,550.00

***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	\$348.00 per semester hour
3 hrs.	\$1,044.00
OUT-OF-STATE	\$1,052.00 per semester hour
3 hrs.	\$3,156.00

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 13, 2009) 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 7 - 11	NO CHARGE	100%
January 12 - 17	20% CHARGE	80%
January 18 - 22	40% CHARGE	60%
January 23 - 27	60% CHARGE	40%
January 28 - 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 A102, 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 F. The course will not be counted in the cumulative grade point average until a final grade is assigned. Students wishing to graduate Spring Semester 2009 must remove all INCOMPLETE GRADES by **April 24, 2009**.

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 2009 academic year is provided by United Health Care. The premium must be paid before registration. Contact the Admission and Student Affairs Office (A104 ext. 432) or email Callie Taylor at ctaylor@utsi.edu 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....April 25, 26, 27, 2009

FINAL EXAMS.....April 28, 29, 30, 2009

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, A102.

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

Thursday, April 20, 2009

(Tentative Date)

3:00 P.M.

UTSI Auditorium

There will be **NO** scheduled classes at this time by request of
Dr. Angie Bukley, Interim Associate Vice President for UTSI
Assistant Vice President of Research

Faculty will reschedule any afternoon classes tentatively scheduled for
April 20, 2009 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 2009 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

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 E112
TEXT: F. White: Viscous Flow; 2nd Ed., ISBN# 0-07-069712-4
PROFESSOR: Dr. Thad Morton

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)
SEC. 001
TIME: Monday & Thursday 10:45 – 12:00 B112
TEXT: TBD
PROFESSOR: Dr. Gary Flandro

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

AE 535 MECHANICAL VIBRATIONS (3)
SEC. 001 (Same as ME 534/ES 534)
TIME: Tuesday & Friday 9:15 – 10:30 E210
TEXT: Lecture notes, handouts, reserved books form the Library
PROFESSOR: Dr. Gary Flandro

Vibrations of linear, discrete, undamped and damped systems. Lagrange's equations for Modal analysis. Laplace transform. Response to mechanical transients. *Prerequisite: Undergraduate vibrations course.*

*AE 539 CONTINUUM MECHANICS (3) **CANCELLED**
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 551 AEROSPACE MECHANICS (3)
SEC. 001 (Same as ME 551)
TIME: Tuesday & Friday 7:45 – 9:00 E211
TEXT: Class Notes
PROFESSOR: Dr. Gary Flandro

Principles of mechanics applicable to aerospace vehicles, equations of motion, multibody problems and trajectory analysis. Mission analysis, Lagrangian and Hamiltonian formulations, rotating coordinate systems, orbital operations, advanced deep-space propulsion techniques including solar sailing, gravity assist, and tether propulsion. *Prerequisite(s): Mathematics 471.*

*AE 557 AEROSPACE VEHICLE FLUTTER & VIBRATION (3) **CANCELLED**
SEC. 001
TIME: Monday & Thursday 7:45 – 9:00 B112
TEXT: TBD
PROFESSOR: TBD

Aeroelastic phenomena. Structural and aerodynamic operators. Stability criteria for airfoils operating in oscillating stream. Two-and-three-dimensional flutter of wings, control surfaces and empennages. *Prerequisite: 423, 551.*

AE 590 SELECTED ENGINEERING PROBLEMS (1-3)
SEC. 001
PROFESSOR: Dr. Gary Flandro

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 E112
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: COMPLEX FLOW DIAGNOSIS AND
MANAGEMENT (3) **CANCELLED**
SEC. 003
TIME: Monday & Thursday 10:45 – 12:00 E210
TEXT: Selected chapters of J. Z. Wu, H. Y. Ma & M. D. Zhou; Vorticity and Vortex Dynamics, Springer, 2006.
PROFESSOR: Dr. J.Z. Wu

While the analysis and behavior of an engineering flow is typically defined in terms of primary variables like the distribution of velocity and pressure in the flow, it is actually dominated by local dynamic processes and structures that cannot be characterized by primary variables themselves. In fact, it is the space-times derivatives of the fluid motion, such as vorticity, dilatation, pressure gradient, etc. that govern the behavior of the flow. To fully diagnose what key local processes/structures dominate the flow performance, and to rationally optimize the flow management (including configuration design and flow control), special theories are needed to re-express global performances by local dynamics. In this special course we present a conceptual discussion and critical review of the theories of this type. They are applicable to both external and internal flows, with large Reynolds numbers and wide range of Mach numbers. We exemplify the application of these theories by various worked-out numerical examples in both external and internal hydro- and aerodynamics, showing why the diagnosis and management based on local dynamics can lead to in-depth physical understanding and significant performance improvement.

AE 600 DOCTORAL & RESEARCH DISSERTATION (3 - 15)
SEC. 001 Schulz
005 Antar
006 Flandro
007 Majdalani
008 Steinhoff
009 Vakili
010 Corda

AE 661 ADVANCED TOPICS IN COMPUTATIONAL FLUID DYNAMICS (3)
 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. 002 (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.*

AVIATION SYSTEMS

AS 500 MASTER'S THESIS (1 - 15)
 SEC. 001 Solies
 002 Ranaudo
 003 Corda

004 Collins
005 Muratore
008 Pujol

AS 502 REGISTRATION FOR USE OF FACILITIES (1-15)
SEC. 001 Corda
002 Solies
003 Ranaudo
004 Collins
005 Murartore
006 Pujol

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) (Videotaped from UTSI)
TIME: Tuesday & Friday 1:00 – 2:15 E112
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.

AS 510 SPECIAL TOPICS: INTRODUCTION TO AVIONICS II (3)
SEC. 001 (Videotaped at UTSI)
TIME: Tuesday & Friday 10:30 – 11:45 E113
TEXT: Len Buckwalter: Avionics Training for Systems, Installation and Troubleshooting: 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 (Videotaped at UTSI)
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 510 SPECIAL TOPICS: HUMAN FACTORS IN CREW STATION DESIGN (3)
SEC. 003 (Interactive Video)

TIME: Tuesday and Thursday 10:15 – 11:30 E 112

TEXT: 1) Jarrett: Cockpit Engineering; 1st Ed., Ashgate

2) Harris: Human Factors in Civil Flight Deck Design; 1st Ed., Ashgate

PROFESSOR: Richard Ranaudo

Cockpit design criteria are presented for various fighter and transport aircraft relating to anthropometric and accommodation issues such as visibility, reach, strength, and body size. Criteria for design of various cockpit displays including head-up guidance, helmet mounted, and audio systems displays are presented along with conventional head-down display layouts. Issues relating to human information processing characteristics are related to mission analysis and display requirements. This course is designed for pilots, test pilots, and engineers involved in human factors and systems engineering. *Prerequisite: AS 515 or permission of instructor.*

*AS 510 SPECIAL TOPICS: HUMAN FACTORS DURING SPACE FLIGHT (3)
SEC. 004 (Video Taped at UTSI) **CANCELLED**

TIME: Tuesday & Friday 8:45 – 10:00 E113

TEXT: TBD

PROFESSOR: Dr. Gilles Clement

Current Problems, course description to be added at a later date.

AS 516 Flight Controls (Stability and Control)

SEC. 001 (Interactive Video)

TIME: Monday & Thursday 10:15 – 11:30 E113

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: Dr. Stephen Corda

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 Solies
003 Collins
004 Ranaudo
005 Muratore
006 Pujol

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

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 from UTSI (Same as Math 472)
TEXT: Burden & Faires: Numerical Analysis; 8th Ed., Brooks/Cole; ISBN: 0-534-38216-9
TIME: Monday & Wednesday 2:30 – 3:45 E112
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.*

*CS 594 INTRODUCTION TO COMPUTER SCIENCE FOR COMPUTATIONAL
SCIENTISTS (3) **CANCELLED**
SEC. 008 (Interactive Video originating from UTSI)
TIME: Wednesday 4:00 – 6:35 E113
TEXT: C Pocket Reference; Peter Prinz and Ulla Kirch-Prinz; O'Reilly, 2002: ISBN-10:
0596004362, ISBN-13: 978-0596004361

PROFESSOR: Dr. Bruce Whitehead

Students in any field are welcome in this course, whether or not you're interested in the Interdisciplinary Graduate Minor in Computational Science (IGMCS). Topics include basic data structures, effective compiler toolchain use, Fortran/C interoperability, concurrency, parallel computing models & application programming interfaces (APIs), and cluster computing. Readings on each of these topics (available on the web) will supplement the textbook. Evaluation will be based primarily on 5 programming assignments spaced at intervals of 2-3 weeks throughout the semester.

Prerequisite: Either the C or Fortran programming language, but not necessarily both. We will learn enough C in this course to enable you to do the programming assignments in C if you want to learn how to program in that language. However, you can choose to do each assignment in either C or Fortran, in case you already know Fortran and are more comfortable using it.

In this course, we will use the gcc and gfortran (C and Fortran) compilers that are free, high quality, open source, and widely used. Instructions will be provided in the course for installing these compilers on Windows (XP or Vista) systems, as a part of the Cygwin software suite freely available over the Internet. (Linux users are also welcome, but prior knowledge of Linux or Unix is not necessary for this course.)

Although taught over interactive video, this course will be hands-on to the greatest extent possible. The topics in this course are learned best by doing, not just by listening to a lecture. If you own a laptop, you are strongly encouraged to bring it with you to each class meeting, so that you can tinker with and run example programs as we discuss them in class. (You are encouraged to do the same if you view a class meeting off-line.)

For further information about this course (or about the IGMCS program), please contact Dr. Whitehead at bwhitehe@utsi.edu or 931-393-7296.

CS 594 SPECIAL TOPICS: EMBEDDED SYSTEMS SOFTWARE
DEVELOPMENT (3)
SEC. 007 (Cross-listed as ECE 599 Section 008)
TIME: Tuesday & Friday 1:00 – 2:15 E211
TEXT: TBD
PROFESSOR: Dr. Bruce Whitehead

This course aims to provide the knowledge, software tools, and hands-on experience necessary to develop efficient software for embedded systems. Topics include compiling software for embedded systems (cross-compilers, linking, loading, libraries, debugging); programming embedded hardware (memory management, embedded storage, communication interfaces, interrupt service routines, device drivers); embedded operating environments (bootloading, file systems, kernels, pre-emptibility, real-time constraints); and embedded software design/development (hierarchical state machines, modularity, performance analysis, code optimization). The course will provide extensive hands-on experience using real embedded systems and the freely available open source software tools that run on these systems. The goal, however, is to develop an understanding of concepts and methods that will be useful for developing high-quality embedded software regardless of the specific tools that may be adopted for a given project. *Prerequisite: C language programming.*

ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

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

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

ECE 502 REGISTRATION FOR USE OF FACILITIES (1-15)
SEC. 002 Smith

*ECE 504 RANDOM PROCESS THEORY FOR ENGINEERS (3)
SEC. 001 (Video Recorded) **CANCELLED**

TIME: Wednesday & Friday 10:00 – 11:15 E112

TEXT: Probability, Random Variables and Random Signal Principles; Peyton Z. Peebles, Jr.; McGraw-Hill; 4th Ed.; ISBN # 0-07-366007-8.

PROFESSOR: Dr. L. Montgomery Smith

Probability and random signals as approached by set theory. Random variables: expected values and transformations of random variables. Random processes: stationarity, correlation functions, temporal analysis, and frequency analysis using power spectral densities. The material to be covered in the text is Chapters 1-9.

ECE 556 WIRELESS SENSOR NETWORKS (3)
SEC. 002

TEXT: Protocols and Architectures for Wireless Sensor Networks; Holger Karl, Andreas Willig; ISBN: 978-0-470-51923-3

TIME: Tuesday & Friday 10:45 – 12:00 F252

PROFESSOR: Dr. Bruce Bomar

Principles and design approaches of wireless sensor networks. Topics include operating systems and programming languages, physical network properties, Media Access Control protocols, geographical routing, data aggregation, real-time communication, query processing, power management, sensing coverage, and applications.

ECE 599 SPECIAL TOPICS: EMBEDDED SYSTEMS SOFTWARE
DEVELOPMENT (3)

SEC. 008 (Cross-listed as CS 594 Section 007)

TIME: Tuesday & Friday 1:00 – 2:15 E211

TEXT: TBD

PROFESSOR: Dr. Bruce Whitehead

This course aims to provide the knowledge, software tools, and hands-on experience necessary to develop efficient software for embedded systems. Topics include compiling software for embedded systems (cross-compilers, linking, loading, libraries, debugging); programming

embedded hardware (memory management, embedded storage, communication interfaces, interrupt service routines, device drivers); embedded operating environments (bootloading, file systems, kernels, preemptibility, real-time constraints); and embedded software design/development (hierarchical state machines, modularity, performance analysis, code optimization). The course will provide extensive hands-on experience using real embedded systems and the freely available open source software tools that run on these systems. The goal, however, is to develop an understanding of concepts and methods that will be useful for developing high-quality embedded software regardless of the specific tools that may be adopted for a given project. *Prerequisite: C language programming.*

*ECE 599 SPECIAL TOPICS: MULTIDIMENSIONAL DIGITAL SIGNAL PROCESSING (3) **CANCELLED**

SEC. 009

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

TEXT: Multidimensional Digital Signal Processing; D. E. Dudgeon and M. Mersereau; Prentice Hall; Latest Edition; ISBN # 0-13-604959-1.

PROFESSOR: Dr. L. Montgomery Smith

Advanced topics in multidimensional signal processing with special emphasis on 2-D filter design and implementation techniques. Topics to be covered include: (a) Multidimensional Signals and Systems: concepts of linearity, shift-invariance, periodicity, frequency spectra, and sampling; (b) Computation of the 2-D Discrete Fourier Transform: row-column decomposition methods and higher-radix FFTs; (c) Design and Implementation of 2-D FIR Filters: windowing, McClellan transformation, and weighted least-squares methods; and (d) Design and Implementation of 2-D Recursive (IIR) Filters: the 2-D z -Transform, stability criteria, canonical forms, state-space realizations, numerical design techniques. Grade will be based upon homework problems and computer projects. *Prerequisite: Consent of instructor required.*

ECE 600 DOCTORAL RESEARCH AND DISSERTATION (3-15)

SEC. 025 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 534 MECHANICAL VIBRATIONS

SEC. 001 (Same as AE 535/ME 534)

TIME: Tuesday & Friday 9:15 – 10:30 E210

TEXT: Lecture notes, handouts, reserved books form the Library

PROFESSOR: Dr. Gary Flandro

Vibrations of linear, discrete, undamped and damped systems. Lagrange's equations for Modal analysis. Laplace transform. Response to mechanical transients. *Prerequisite: Undergraduate vibrations course.*

*ES 539 CONTINUUM MECHANICS (3) **CANCELLED**
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 595 SEMINARS: ENGINEERING SCIENCE (1)
SEC. 002 Dr. Ahmad Vakili

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

ES 600 DOCTORAL & RESEARCH DISSERTATION (1 – 15)
SEC. 001 Schulz
004 Antar
005 Flandro
006 Majdalani
007 Steinhoff
008 Vakili

ES 651 ADVANCED TOPICS IN COMPUTATIONAL FLUID DYNAMICS (3)
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 Students not located at Tullahoma or Oak Ridge

SEC. 003 Students located at Tullahoma or Oak Ridge

PROFESSORS: Dr. Denise Jackson and Dr. Gregory Sedrick

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 Students not located at Tullahoma or Oak Ridge

SEC. 003 Students located at Tullahoma or Oak Ridge

PROFESSORS: Dr. Denise Jackson and Dr. Gregory Sedrick

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/iieandem/student_services.htm

TIME: Thursday 4:00 – 6:50 E113

PROFESSOR: Dr. Joe Costa

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 – 6:50 E113
TEXT: http://www.utsi.edu/academics/ieandem/student_services.htm
PROFESSOR: Dr. George Garrison

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 – 6:50 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 Garrison

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 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 – 6:50 E113

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

PROFESSOR: Dr. Gregory Sedrick

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 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 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 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 692 ADVANCED TOPICS IN INDUSTRIAL ENGINEERING (3)
 SEC. 002 Sedrick

MATERIALS SCIENCE

MSE 500 THESIS (1 – 15)
 SEC. 002 Dr. William Hofmeister

MSE 503 GRADUATE SEMINAR IN MATERIALS SCIENCE & ENGINEERING (1)
 SEC. 003
 TIME: Wednesday 3:00 CLA Conference Room
 PROFESSOR: Dr. George Murray

Theme: Biomimetic materials.

MSE 512 FUNDAMENTALS OF MATERIALS SCIENCE AND ENGINEERING II (3)
 SEC. 001
 TIME: Tuesday & Friday 1:00 – 2:30 F252
 TEXT: TBD
 PROFESSOR: Dr. William Hofmeister

Physical properties: electrical and thermal conduction, elementary quantum physics, band theory, dielectric materials, magnetic and optical properties. Mechanical behavior: stress and strain at a point, elastic constitutive equations, phenomenological bulk behavior, and deformation mechanisms.

MSE 540 BASIC POLYMER CHEMISTRY (3)
 SEC. 001
 TIME: Monday & Thursday 10:45 – 12:00 F253
 TEXT: TBD
 PROFESSOR: Dr. Zhongren Yue

Synthesis, reactions and degradation of polymers. Molecular characterization: solution methods and spectroscopy.

COMMENTS: Introductory concepts and definitions of polymers. Polymer solution properties, conformation and molecular weight characterization. Fundamentals of polymer science and engineering. The structure and characterization of polymers. Rheological and viscoelastic behavior: relaxations and transitions, rubber elasticity. Crystallinity, morphology and deformation of crystalline polymers. Compounding and processing of plastics. Description of major structure, properties and utilization of polymers and polymer materials- plastics, fibers, rubbers, composites, etc.

MSE 576 SPECIAL TOPICS IN MS&E: NANOMATERIALS (3)

SEC. 003

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

TEXT: TBD

PROFESSOR: Dr. Jackie Johnson, Dr. Charles Johnson, Dr. Othman Zalloum

Luminescent materials in medicine, luminescent materials in renewal energy, luminescent materials in defense, other topic approved by the Instructor.

MSE 600 DIRECT DOCTORAL DISSERTATION (1-15)

SEC. 002 Dr. William Hofmeister

MATHEMATICS

MATH 431 DIFFERENTIAL EQUATIONS II (3)

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) **CANCELLED**

SEC. 002

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

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)

SEC. 002 Videotaped from UTSI

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

TIME: Monday & Wednesday 8:45 – 9:30 E113

PROFESSOR: Dr. Trevor Moulden

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

MATH 472 NUMERICAL LINEAR ALGEBRA (3)

SEC. 001 Videotaped from UTSI (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 E112

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 500 MASTER'S THESIS (1 - 15)
SEC. 002 Dr. Boris Kupershmidt

*MATH 518 MATHEMATICAL METHODS IN PHYSICS (3) **CANCELLED**
SEC. 001 (Same as Physics 572)
TIME: Monday & Thursday 1:00 – 2:15 B210
TEXT: G. Arfken: Mathematical Methods for Physicists; 5th Ed., Harcourt/Academic Press
ISBN# 0-12-059825-6
PROFESSOR: Dr. Boris Kupershmidt

Linear vector spaces, matrices, tensors, curvilinear coordinates, functions of a complex variable, partial differential equations and boundary value problems, Green's functions, integral transforms, integral equations, spherical harmonics, Bessel functions, calculus of variations. Prereq: Advanced calculus and differential equations. Must be taken in sequence. (*Same as Physics 571-572*).

MATH 519 SEMINAR IN APPLIED MATHEMATICS (1-3)
SEC. 002
TEXT: Notes provided by Instructor
TIME: Monday 10:15 – 11:30 E112
Thursday TBD TBD
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. 004 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 (Videotaped)
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: Tuesday & Friday 1:00 – 2:15 E210
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 534 MECHANICAL VIBRATIONS
SEC. 001 (Same as AE 535/ES 534)
TIME: Tuesday & Friday 9:15 – 10:30 E210
TEXT: Lecture notes, handouts, reserved books form the Library
PROFESSOR: Dr. Gary Flandro

Vibrations of linear, discrete, undamped and damped systems. Lagrange's equations for Modal analysis. Laplace transform. Response to mechanical transients. *Prerequisite: Undergraduate vibrations course. Same as Aerospace Engineering 535 and Engineering Science 534.*

*ME 539 CONTINUUM MECHANICS (3) **CANCELLED**
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 540 PERTURBATION METHODS IN ENGINEERING (3)
SEC. 001
TIME: Tuesday & Friday 3:00 – 4:15 B210

TEXT: David C. Wilcox; Perturbation Methods in the Computer Age; DCW Industries, Inc.; 1995.

PROFESSOR: Dr. Joseph Majdalani

Solution of nonlinear problems in solid and fluid mechanics and dynamics by use of asymptotic perturbation techniques. Asymptotic expansions, regular and singular perturbations and applications in dynamics, celestial mechanics, potential, viscous and compressible flows. Uniformly valid approximations in various physical problems. Generalized boundary-layer techniques. Coordinate straining techniques; Poincare's method. Matched asymptotic expansions and multiple scales. Problems with several time or length scales. Examples taken from various fields of science. *Registration Permission: Consent of Instructor.*

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 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.

ME 551 AEROSPACE MECHANICS (3)

SEC. 001 (Same as AE 551)

TIME: Tuesday & Friday 7:45 – 9:00 E211

TEXT: Class Notes

PROFESSOR: Dr. Gary Flandro

Principles of mechanics applicable to aerospace vehicles, equations of motion, multibody problems and trajectory analysis. Mission analysis, Lagrangian and Hamiltonian formulations, rotating coordinate systems, orbital operations, advanced deep-space propulsion techniques including solar sailing, gravity assist, and tether propulsion. *Prerequisite(s): Mathematics 471.*

*ME 552 MECHANICAL DESIGN (3) **CANCELLED**

SEC. 001

TIME: Tuesday & Friday 7:45 – 9:00 E210

TEXT: M. F. Spotts: Design of Machine Elements; Latest Ed, Prentice-Hall, Inc.

ISBN# 0-13-200593-X

PROFESSOR: TBD

This course concentrates on the back ground and application of stress analysis in the design of mechanical systems. Topics will include: fundamental principles of stress and factors of safety in design, linear elastic fracture mechanics, and design of shafting, connections, springs, bearings, etc. The design principles will be presented and attention will focus on the limitations imposed by the assumptions.

ME 582 ROCKET PROPULSION II (3)

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)

SEC. 001 (Video Recorded)

TIME: Tuesday & Thursday 4:00 – 5:15 E112

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 augmentor 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 587 DYNAMIC MODELING AND SIMULATION (3) **CANCELLED**

SEC. 001

TIME: Tuesday & Friday 2:30 – 3:45 E210

TEXT: Instructor Notes

PROFESSOR: TBD

Theoretical models for a variety of engineering systems are developed from first principles and analyzed using both analytical and numerical methods. Generalized solutions are studied to determine system responses and failure modes. Emphasis is placed on developing good engineering models involving first and second order differential equations, systems of equations, partial differential equations and finite differencing. Systems applications involve mechanical, electrical and aero-thermal engineering fundamentals.

ME 590 SELECTED ENGINEERING PROBLEMS (2-6)

SEC. 001 Dr. Montgomery Smith

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 UTSL. May be repeated.

ME 599 SPECIAL TOPICS IN ME: HYBRID ROCKET PROPULSION (3)

SEC. 001

TEXT: Martin J. Chiaverini and Kenneth K. Kuo; Fundamentals of Hybrid Rocket Combustion and Propulsion; American Institute of Aeronautics; ISBN # 1563477033.

TIME: Tuesday & Friday 2:30 – 3:45 B210
PROFESSOR: Dr. Joseph Majdalani and Mr. Paul Gloyer

This course reviews the fundamentals of hybrid rocket propulsion with special emphasis on application-based design and system integration, propellant selection, flow and regression rate modeling, solid fuel pyrolysis, scaling effects, transient behavior, and combustion instability. Advantages and disadvantages of both conventional and swirl-driven vortex hybrid configurations are examined. Course includes testing of laboratory-scale hybrid rockets.

Prerequisite: Mechanical Engineering 581, or instructor's consent.

ME 599 SPECIAL TOPICS IN ME: PLASMA RADIATION (3)
SEC. 003

TIME: Tuesday & Friday 1:00 – 2:15 F252

TEXT: Robert Spiegel and John R. Howell; Thermal Radiation Heat Transfer; 3rd Ed.; Hemisphere Publishing Corporation, Washington, DC; ISBN # 0-89116-271-2

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

PROFESSOR: Dr. Trevor Moeller

ME 600 DOCTORAL and RESEARCH DISSERTATION (3 - 15)

SEC. 001 Schulz
016 Antar
017 Majdalani
018 Flandro
019 Vakili
021 Steinhoff
022 Moeller

ME 651 ADVANCED TOPICS IN COMPUTATIONAL FLUID DYNAMICS (3)

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 H-111
PROFESSOR: Dr. Horace Crater

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

*PHYS 507 CONTEMPORARY OPTICS (3) **CANCELLED**
SEC. 002
TIME: Monday & Thursday 10:45 – 12:00 CLA Conference Room
PROFESSOR: Dr. Lloyd Davis

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

*PHYS 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 (Videotaped at UTSI)
TIME: Monday & Thursday 8:45 – 10:00 E112
TEXT: Sakurai: Quantum Mechanics; Addison Wesley
PROFESSOR: Dr. Horace Crater

Fundamental principles of quantum mechanics, free particle, harmonic oscillator, hydrogenation, angular momentum, electron spins, particles in electric and magnetic fields, perturbation theory, variational methods, scattering theory. Application of quantum mechanics to problems of atomic, molecular, nuclear, and solid state physics. *Prerequisite: Physics 521.*

PHYS 541 ELECTROMAGNETIC THEORY (3)
SEC. 002
TIME: Monday & Thursday 10:45 – 12:00 F252
TEXT: Greiner, Classical Electrodynamics, Springer 1998; and other classical references, e.g., Jackson, Classical Electrodynamics, 3rd edition 1998, Hartemann, High Field Electrodynamics, CRC Press, 2002; and on-line references, e.g., Bo Thide, Classical Electrodynamics, <http://www.plasma.uu.se/CED/Book/>, 2008.
PROFESSOR: Dr. Christian Parigger

Review of electrostatics, magnetostatics, and quasi-static problems; Maxwell's field equations and their solutions in dielectric and conducting media; electrodynamics and relativity retarded potentials and gauge transformations, radiation produced by accelerating charges.

*PHYS 572 MATHEMATICAL METHODS IN PHYSICS (3) **CANCELLED**
SEC. 001 (Same as Math 518)

TIME: Monday & Thursday 1:00 – 2:15 B210
TEXT: G. Arfken: Mathematical Methods for Physicists; 5th Ed., Harcourt/Academic Press
ISBN# 0-12-059825-6
PROFESSOR: Dr. Boris Kupershmidt

Linear vector spaces, matrices, tensors, curvilinear coordinates, functions of a complex variable, partial differential equations and boundary value problems, Green's functions, integral transforms, integral equations, spherical harmonics, Bessel functions, calculus of variations.
Prerequisite: Advanced calculus and differential equations. Must be taken in sequence.

*PHYS 573 NUMERICAL METHODS IN PHYSICS (3) **CANCELLED**

SEC. 002

TIME: Tuesday & Friday 2:30 – 3:45 E211

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)

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 600 DOCTORAL & RESEARCH DISSERTATION (3 - 15)

SEC. 002 Crater
003 Lewis
004 Davis
005 Parigger
006 Chen

***PHYS 611 ADVANCED QUANTUM MECHANICS AND FIELD THEORY (3) CANCELLED**

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 E211

PROFESSOR: Dr. Christian Parigger

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

***PHYS 627 ELEMENTARY PARTICLE PHYSICS (3) CANCELLED**

SEC. 001

TEXT: TBD

TIME: Monday & Thursday 1:00 – 2:15 B112

PROFESSOR: Dr. Horace Crater

Advanced topics – quark models, electroweak interactions, and unification of elementary forces. **(Comment(s): Intended for students specializing in the field).**

***PHYS 671 ADVANCED SOLID STATE PHYSICS (3) CANCELLED**

SEC. 002

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.*

PHYS 671 ADVANCED SOLID STATE PHYSICS (3)

SEC. 002

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.*