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CALENDAR --- 2007 SPRING SEMESTER

Priority Registration.....	October 16, 2006 – January 3, 2007
Admission to Candidacy Forms for Spring 2007 Commencement.....	December 5, 2006
Spring 2007 Graduation Application Deadline .....	December 5, 2006
University Closed, but CPO.UTK.EDU is available .	December 25 – 29, 2006 and January 1, 2007
<b>Late Registration and late fees begin .....</b>	<b>January 4, 2007</b>
Classes begin.....	January 10, 2007
Martin Luther King Holiday.....	January 15, 2007
Last Day to Late Register, Add, Change Grading Options or Drop without a “W”. January 19, 2007	January 19, 2007
Last day to add/change credit with signatures.....	February 20, 2007
Graduation Fee Payment Deadline (MS \$30, PhD \$75).....	March 9, 2007
Spring Break (No Classes) .....	March 12 – 16, 2007
Purchase cap and gown and order hood .....	March 23, 2007
If you plan to attend the Graduate Hooding Ceremony .....	March 23, 2007
Last day to schedule final exam (thesis).....	March 23, 2007
Preliminary Thesis/Dissertation Review Deadline .....	March 23, 2007
Last day to schedule final exam (non-thesis/capstone students) .....	March 27, 2007
Last day to schedule final exam (dissertation).....	March 30, 2007
Drop with a “W” .....	April 3, 2007
Last day to take final exam (thesis/dissertation students) .....	April 5, 2007
Last day to take final exam (non-thesis/capstone students).....	April 5, 2007
Spring Recess (No Classes).....	April 6, 2007
Electronic Thesis/Dissertation Deadline .....	April 20, 2007
Paper Thesis/Dissertation due in Knoxville (5:00 P.M. EST).....	April 20, 2007
Submit report of final examination (Pass/Fail) form.....	April 20, 2007
Deadline for Submission of Admission to Candidacy for students	
Graduating Summer 2007 and Graduation Application .....	April 27, 2007
Deadline for removing "INCOMPLETE" grades.....	April 27, 2007
Classes End.....	April 27, 2007
Total Withdraw from the University Deadline.....	April 27, 2007
Study Period.....	April 30 - May 1, 2007
Exam Period.....	May 2 – 4, 7, and 8, 2007
Graduate Hooding Ceremony (UTK) .....	May 10, 2007
COMMENCEMENT (UTK).....	TBD
Second thesis/dissertation deadline (Student will receive diploma August 2007 but do not have to register for Summer 2007)(Defense Completed by April 27) ....	May 25, 2007

SUMMER SEMESTER 2007

Priority Registration for Summer Semester 2007 UTSI begins .....	March 5, 2007
Final Registration for UTSI students .....	TBD
Memorial Day Holiday .....	May 28, 2007
Classes begin.....	June 4, 2007
July 4 <sup>th</sup> Holiday .....	July 4, 2007
Classes End.....	August 10, 2007
Summer Graduation Date on Transcript (No Ceremony) .....	August 17, 2007

**SPRING SEMESTER 2007  
FINAL STUDY DAY AND EXAM SCHEDULE**

LAST DAY OF CLASSES .....April 27, 2007

STUDY PERIOD .....April 30 - May 1, 2007

FINAL EXAMS May 2, 3, 4, 7 and 8, 2007

REGULAR CLASS TIME	(Same Classroom)	EXAM TIME
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1<sup>st</sup> Day - Wednesday, May 2, 2007

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

2<sup>nd</sup> Day - Thursday, May 3, 2007

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

3<sup>rd</sup> Day - Friday, May 4, 2007

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 2007

### 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 2007 Spring semester on the Web at Circle Park Online <https://cpo.utk.edu/CPOWeb/>. The registration system will be available Monday through Saturday, 7:00 AM - 11:00 PM (CST) and Sundays 12:00 PM - 5:00 PM (CST). Registration will be October 16, 2006 – January 3, 2007. Late registration will be January 4, 2007. Classes begin Wednesday, January 10, 2007.

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](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](mailto:cpo@utk.edu)

#### Days of the Week

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

## Financial Calendar for Spring Term 2007

Last Registration Day for Receiving Statements by Mail	December 9, 2006
Statement Information Available on CPO	December 11, 2006
Priority Registration Payment/Confirmation Deadline	January 3, 2007 (3:30 pm CST)
Late Registration/Late Fees Begin	January 4, 2007
Late Payment and Confirmation Deadline	January 19, 2007 (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](mailto: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](mailto: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](mailto:rnee@utsi.edu) or Vicki Carr at [vcarr@utsi.edu](mailto: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 4, 2007. 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	<a href="mailto:scorda@utsi.edu">scorda@utsi.edu</a>
Engineering Mgt.	Penny Morris	931-393-7293	<a href="mailto:pmorris@utsi.edu">pmorris@utsi.edu</a>

## TUITION AND/OR MAINTENANCE FEES\*

### Full Fees For In-State Students (per semester)

Maintenance Fee .....	\$2787.00*
Programs and Services Fee .....	90.00
Total .....	\$2877.00

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

Maintenance Fee .....	\$2787.00*
Programs and Services Fee .....	90.00
Tuition .....	\$5633.00*
Total .....	\$8510.00

**\*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	\$310.00 per semester hour
3 hrs.	\$930.00
OUT-OF-STATE	\$937.00 per semester hour
3 hrs.	\$2811.00

## **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 26, 2007) 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/FEES 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):

<b>DROP DATE</b>	<b>CHARGE</b>	<b>REFUND</b>
January 10- 14	NO CHARGE	100%
January 15 - 20	20% CHARGE	80%
January 21 - 25	40% CHARGE	60%
January 26 – 30	60% CHARGE	40%
January 31 - 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 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 2007 must remove all INCOMPLETE GRADES by **April 27, 2007**.

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 2007 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](mailto: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 2007**

STUDY PERIOD...April 30 & May 1, 2007

FINAL EXAMS.....May 2, 3, 4, 7, and 8, 2007

## **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**

**Annette Gordon-Reed, PhD  
Professor of Law  
New York Law School**

**Thursday, April 12, 2007**

**3:00 P.M.**

**UTSI Auditorium**

There will be **NO** scheduled classes at this time by request of  
Donald C. Daniel, PhD, UT Associate Vice President  
UTSI Chief Operating Officer

Faculty will reschedule any afternoon classes tentatively scheduled  
For April 12, 2007 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 2007 COURSE LISTINGS**

**AEROSPACE ENGINEERING (018)**

AE 500            Master's Thesis (1 - 15)  
SEC. 001        Schulz, Roy  
         010        Antar, Basil  
         011        Flandro, Gary  
         012        Majdalani, Joseph  
         013        Moeller, Trevor  
         015        Steinhoff, John  
         016        Vakili, Ahmad  
         017        Moulden, Trevor

AE 502            Use of the Facilities (1 - 15)  
SEC. 002        Dr. Roy Schulz

AE 512            Viscous Flow (3)  
SEC. 001  
TIME:            Monday & Thursday 1:00 – 2:15  
ROOM:           E 112  
PROFESSOR:     Dr. Ahmad Vakili  
TEXT:            F. White: *Viscous Flow*, 2<sup>nd</sup> ed., ISBN# 0-07-069712-4

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

\*AE 516            Air Vehicle Aerodynamics/Performance **CANCELLED**  
SEC. 001  
TIME:            TBA  
ROOM:           TBA  
PROFESSOR:  
TEXT:            TBD

Application of aerodynamics principles to air vehicles to provide estimates of performance, stability, and control characteristics for subsonic to hypersonic speeds. Relations among thrust, drag, lift and attitude, propulsion systems, vehicle performance characteristics, and trajectory optimization. Prereq: 422; 515 for 516.

\*AE 535            Mechanical Vibrations **FIRST CLASS MEETS JANUARY 22ND**  
SEC. 002        (Same as ME 534/ES 534)  
TIME:            Monday & Thursday    7:45 a.m. – 9:00 a.m.  
ROOM:           E 211  
PROFESSOR:     Dr. Gary Flandro  
TEXT:            Lecture notes, handouts, reserved books form the Library

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

AE 539            Continuum Mechanics (3)  
SEC. 001        (Same as ES 539 & ME 539)  
TIME:           Monday & Thursday 10:45 – 12:00 Noon  
ROOM:          B 112  
PROFESSOR:    Dr. T. H. Moulden  
TEXT:           L. E. Malvern: *Introduction to the Mechanics of a Continuous Medium*; Prentice Hall, ISBN# 13 487603 2

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  
ROOM:          E 211  
PROFESSOR:    Dr. Basil Antar  
TEXT:           1. H. Tennekes & J. Lumley: *A First Course in Turbulence*, MIT, Latest Ed  
                  2. R.L. Panton: *Incompressible Flow*; Wiley Interscience; Latest publications

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 544            Introduction to Transonic Flow (3)  
SEC. 002  
TIME:           TBD  
ROOM:          TBD  
PROFESSOR:    Dr. T. H. Moulden  
TEXT:           T. H. Moulden: *Fundamentals of Transonic Flow*; Krieger 1991; ISBN 0-89464-441-6

Outline: This course will be concerned with the physical structure of transonic flows. Topics covered include the equations of motion, flow physics, shock—wave boundary layer interactions and the structure of a local supersonic flow region. Properties of transonic flow shock waves will also be discussed. Small disturbance theory is discussed to give added insight into the structure of transonic flows.

AE 561            Fundamentals of Aeroacoustics (3)  
SEC. 001  
TIME:           Monday & Thursday    3:00 – 4:15  
ROOM:          B 112  
PROFESSOR:    Dr. Majdalani  
TEXT:           Instructor Notes & Handouts

Generation, propagation, and absorption of sound in static and moving media.

AE 595            Seminars: Aerospace & Mechanical Systems (1)  
SEC. 001        (Same as ME 595)  
TIME:           TBA  
ROOM:          TBA  
PROFESSOR:    Dr. Ahmad Vakili

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

AE 599 Aircraft Design (3)  
SEC. 008 (Cross-Listed as AS506 Section 001) Videotaped from UTSI  
TIME: Tuesday & Friday 1:00 – 2:15  
ROOM: E 112  
PROFESSOR: Dr. U. Peter Solies  
TEXT: D.P. Raymer: *Aircraft Design: A Conceptual Approach*”; AIAA Education Series;  
3rd Ed., 1998. ISBN # 1-56347-281-0

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: Vorticity of Aerodynamics (3)  
SEC. 009  
TIME: Monday & Thursday 10:45 – 12 Noon  
ROOM: E 211  
PROFESSOR: Dr. J. Z. Wu  
TEXT: J. C. Wu: *Elements of Vorticity Aerodynamics, 2005*, 1<sup>st</sup> ed, Tsinghai University Press

As an applied branch of fluid dynamics, aerodynamics deals with forces produced by air or other fluids on bodies moving through it. The only strategy open to the founders of the low-speed (incompressible) aerodynamics a century ago was to seek simple model theories that could bypass the highly nonlinear flow details as much as possible but pinpoint the key physics crucial to the forces. This strategy is the most valuable legacy of those great pioneers. Today, although detailed data of a complicated flow field can be made available by numerical computation and advanced measurement, the physical mechanisms behind the aerodynamic forces by no means surface automatically from the data. Rather, they have to be revealed by theories. Therefore, it is still absolutely necessary to carry forward that great legacy. But for sorting out the key information from the huge ocean of data, modern theories should be as exact and general as possible, yet still simple and neat with in-depth physical insight.

This course introduces to students the elegance and power of classic circulation theory and its modern developments in vorticity aerodynamics. The power of this theory for understanding and diagnosing not only the forces on a conventional wing, but also highly unsteady forces such as those on a maneuvering MAV, on an insect or fish, or on an automobile or submarine, will be highlighted. Requisite background knowledge and the necessary mathematics for this theory will be developed as the course proceeds.

\*AE 599 Special Topics in AE: Radiation Heat Transfer (3) **CANCELLED**  
SEC. 010 Same as ME 599 Section 007 (Transmitted to UTC)  
TIME: Monday & Wednesday 11:00 a.m. - 12:15 p.m.  
ROOM: E 112  
PROFESSOR: Dr. Houshang Ebrahimi  
TEXT: TBD

Thermal Radiation, Blackbody Radiation, Radiation properties, View factor, Radiation Heat Transfer for Black surfaces, Diffuse, Gray surfaces. Radiation Density and Radiation pressure. Radiation of strongly absorbing media. Gas Radiation Numerical methods for Radiation Heat Transfer.

AE 599            Spec Topics in AE: Fundamental Processes in Viscous Fluid Motion (3)  
 SEC. 011  
 TIME:            Monday & Thursday    2:30 - 3:45  
 ROOM:            E211  
 PROFESSOR: Dr. J. Z. Wu  
 TEXT:            Lecture Notes of the Instructor  
 MAJOR REFERENCES: J. Z. Wu, H. Y. Ma, and M. D. Zhou, *Vorticity and Vortex Dynamics*,  
 Pringer-Verlag, 2006, Chapter 2.

This course provides an effective way into the physical/mathematical essence of advanced fluid dynamics, gas dynamics, or external and internal aerodynamics, by introducing the two fundamental processes in a viscous compressible fluid: the compressing/expanding process represented by the pressure and characterized by the Mach number, and the shearing process represented by the vorticity and characterized by the Reynolds number. They can be easily identified from the Navier-Stokes equation, and are coupled through the nonlinearity of the governing equations and boundary conditions. These processes and their coupling exist in all realistic flows. Only in certain simplified theoretical models the two processes could be decoupled and one of them be ignored; it is more often that, depending on specific situations, one process is primary and the other is a byproduct but may have feedback effect to the former.

The course is offered in particular to those who have learned undergraduate fluid dynamics or aerodynamics, and are facing advanced research projects involving complicated flow problems such as unsteady vortical separated flows, wave-vortex interactions and flow control, etc. The course starts from exemplifying the two processes in nature and technology, and then introduces the basic mathematic tool for analyzing the two processes, which is an applied review of vector and tensor operations. How the two processes are coupled will be analyzed and shown by many theoretical, numerical, or experimental examples.

AE 600            Doctoral & Research Dissertation (3 - 15)  
 SEC. 001        Schulz, Roy  
           005        Antar, Basil  
           006        Flandro, Gary  
           007        Majdalani, Joseph  
           008        Steinhoff, John  
           009        Vakili, Ahmad

AE 681            Advanced Viscous Flow Theory (3)  
 SEC. 001  
 TIME:            Monday & Thursday    2:30 – 3:45  
 ROOM:            E 210  
 PROFESSOR: Dr. Trevor Moulden  
 TEXT:            Lecture Notes

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: Nonlinear System Modeling (3)  
**FIRST CLASS MEETS JANUARY 22<sup>ND</sup>**  
 SEC. 003  
 TIME:            Tuesday & Friday        7:45 a.m. – 9:00 a.m.  
 ROOM:            E 211  
 PROFESSOR: Dr. Gary Flandro

TEXT: Ali H. Nayfeh: *NONLINEAR INTERACTIONS Analytical, Computational, and Experimental Methods*; Wiley Series in Nonlinear Science, John Wiley & Sons, ISBN# 0-471-17591-9 (Paperback)

This course introduces the solution of engineering problems requiring nonlinear interactions, bifurcation, and chaos. Many current problems of great practical significance require handling of nonlinear behavior. Nonlinearity gives rise to an entire universe of phenomena not experienced in linear systems. These include multiple solutions and jumps, limit cycles, natural-frequency shifts; subharmonic, superharmonic, and ultra subharmonic resonances; period multiplying, bifurcation, and chaos. The example of nonlinear combustion instability in rockets and jet engine combustors and similar nonlinear vibration problems will be used to demonstrate the new mathematical techniques and associated physical understanding required.

AE 690           Advanced Topics in AE: Linear and Nonlinear Waves (3)  
SEC. 006        Cross-list ES 681 Section 003  
TIME:           Monday & Thursday   4:00 - 5:15  
ROOM:          B 210  
PROFESSOR:    Dr. John Steinhoff  
TEXT:          GB. Witham: Linear and Nonlinear Waves  
                P.C. Drazin & R.S. Johnson: Solitons: An Introduction; ISBN# 0521336554

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. Prereq: include Elementary Partial Differential Equations and Advanced Calculus

AE 690           Advanced Topics in AE: Control of Fluctuating Flow Fields in Combustion Chambers (3)  
SEC. 008  
TIME: TBA  
ROOM: TBA  
PROFESSOR:    Dr. Gary Flandro  
TEXT: TBA

### **AVIATION SYSTEMS (169)**

AS 500           Master's Thesis (1 - 15)  
SEC. 001        Solies, Peter  
                002        Richards, Robert  
                003        Ranaudo, Richard  
                004        Masters, George  
                005        Allison, Rodney  
                006        Kimberlin, Ralph

007 Corda, Stephen  
008 Collins, Frank

AS 502 Registration Use of Facilities (1-15)  
SEC. 001 Corda, Stephen

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 504 Airports and the Community  
SEC. 001 Videotaped from Knoxville  
TIME: Monday 9:00 a.m. – 11:15 a.m.  
ROOM: E 113  
PROFESSOR: Mr. Richard Ranaudo  
TEXT: Wells: *Airport Planning and Management*; McGraw-Hill, 5<sup>th</sup> ed

Structure of airports and their communities. Technology and economics of cargo, baggage, ticket and passenger handling. Airport management, economics and logistics. Interfaces with community. Plans, programs and developments for collecting and distributing passengers and freight from various types of airports. Types of airport developments and their projections. Environmental planning, concerns, and their effects. Airport pavement management.

AS 506 Aircraft Design (3)  
SEC. 001 (Cross-Listed as AE599 Section 008) Videotaped from UTSI  
TIME: Tuesday & Friday 1:00 – 2:15  
ROOM: E 112  
PROFESSOR: Dr. U. Peter Solies  
TEXT: D. P. Raymer: *Aircraft Design: A Conceptual Approach*”; AIAA Education Series; 3rd Ed., 1998. ISBN # 1-56347-281-0

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 507 Introduction to Airborne Radar (3) **CANCELLED**  
SEC: 001 Video Taped from UTSI  
TIME: Friday 9:30 – 12:00  
ROOM: E 113  
PROFESSOR: Dr. George W. Masters, Jr.  
TEXT: Byron Edde: *Radar: Principles, Technology, Applications*; Prentice-Hall, 1993; ISBN# 0-13-752346-7

Theory and application of airborne radar. Radar detection and measurement techniques through aviation systems applications. Ground effects on radar signals of multipath and clutter. Pulsed operation, coding, filters, processing techniques. Doppler effects. Problems of range and range rate and tracking. Methods and techniques for reducing radar cross section.

AS 510 Special Topics: Introduction to Avionics II (3)  
SEC. 001 (Videotaped at UTSI)  
TIME: Tuesday 10:45 – 12:00 Noon & Friday 2:30 - 3:45  
ROOM: E 112  
PROFESSOR: Dr. Alfonso Pujol, Jr.  
TEXT: Len Buckwalter: *Avionics Training for Systems, Installation and*

Troubleshooting: Avionics Communications Inc, 3<sup>rd</sup> edition;  
ISBN 1-88-5544-21-9

Avionics systems satellite and communications, including distance measuring equipment, transponder, and 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: Human Factors in Crew Station Design (3) **CANCELLED**  
SEC. 002 Videotaped at UTSI  
TIME: Tuesday & Thursday 10:00 a.m. – 12:00 Noon  
ROOM: E 113  
PROFESSOR: Mr. Richard Ranaudo  
TEXT: 1) Jarrett: *Cockpit Engineering*; 1<sup>st</sup> ed., Ashgate  
2) Harris: *Human Factors in Civil Flight Deck Design*; 1<sup>st</sup> ed., Ashgate

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.

\*AS 510 Introduction to Airborne Electro-Optical Systems (3) **CANCELLED**  
SEC: 003 Video Taped from UTSI  
TIME: Thursday 4:00 – 6:35 p.m.  
ROOM: E 113  
PROFESSOR: Dr. George W. Masters, Jr.  
TEXT: Richard D. Hudson: *Infrared System Engineering*; Wiley; 2006 (paperback) Preferred; ISBN# 0470099356; or 1989 (hardback) ISBN# 0471418501

Introduction to electro-optics and applications to aviation systems.

AS 521 Experimental Flight Mechanics: Fixed Wing Performance (3)  
SEC. 001  
TIME: Tuesday & Friday 8:00 - 9:15 a.m.  
ROOM: Tullahoma Airport Classroom  
PROFESSORS: Dr. Peter Solies & Dr. Stephen Corda  
TEXT: Ralph D. Kimberlin: *Flight Testing of Fixed-Wing Aircraft*; AIAA Education Series; ISBN# 1 56347 564 2

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

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

## CHEMICAL ENGINEERING (226)

ChemE 500 Thesis (1 - 15)  
SEC. 009  
PROFESSOR: Dr. Atul Sheth

## COMPUTER SCIENCE (266)

CS 494 Special Topics: Databases/ XML Client Programming (3)  
SEC. 005  
TIME: Tuesday & Thursday 1:10 – 2:25  
ROOM: E 113 (for transmission to UT-Knoxville)  
PROFESSOR: Dr. Bruce Whitehead  
TEXT: Elliotte R. Harold & W. Scott Means: *XML in a Nutshell*; O'Reilly & Associates;  
3<sup>rd</sup> ed. 2004; ISBN# 0-596-00764-7  
Chris Fehily: *SQL: Visual Quickstart Guide*; 2<sup>nd</sup> ed., Peachpit Press;  
ISBN# 0321334175

This course begins with an introduction to relational database design and implementation in industry-standard SQL. We then consider methods of interfacing application software to databases based on open specifications such as ODBC (Open Database Connectivity) and JDBC (Java Database Connectivity). Finally, we discuss, in depth, systems which interoperate with databases through higher-level platform-independent standards such as XML (Extensible Markup Language) and CORBA Common Object Request Broker Architecture). XML will receive greater emphasis than the other topics. Throughout the course, the principles discussed will be illustrated in software demonstrated in class and developed in programming assignments. Detailed course description at <http://www.utsi.edu/cs/494>  
Prereq: CS 360 Unix Systems Programming <http://www.cs.utk.edu/~plank/plank/classes/cs360/>  
plus significant experience in C++ or Java.

CS 502 Registration for Use of Facilities (3)  
SEC. 001

## ELECTRICAL AND COMPUTER ENGINEERING (319)

ECE 500 Thesis (1 – 15)  
SEC. 001 Dr. Bruce Bomar  
SEC. 021 Dr. Monty Smith

ECE 501 Project in Lieu of Thesis (3)  
SEC. 001 Dr. Bruce Bomar  
SEC. 002 Dr. Monty Smith

\*ECE 504 Random Process Theory For Engineers (3) **CANCELLED**  
SEC. 001  
TIME: Monday & Thursday 9:15 – 10:30  
ROOM: F 253  
PROFESSOR: Dr. L. Monty Smith  
TEXT: Peyton Z. Zeebles Jr.: *Probability, Random Variables, and Random Signal Principles*; McGraw-Hill, 4th Ed. ISBN# 0-07-366007-8

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

ECE 544          Digital Communications Systems II (3)  
SEC.   005  
TIME:          Tuesday & Friday          9:15 - 10:30  
ROOM:          F 253  
PROFESSOR: Dr. Monty Smith  
TEXT:          B. P. Lathi: *Modern Digital and Analog Communication Systems*; 3<sup>rd</sup> ed., Oxford University Press, 1998; ISBN# 0-19-511009-9

Probability theory: random variables, expected values, correlation, random processes, spectral analysis, application to linear systems, optimal filtering. Behavior of analog communications systems in the presence of noise; signal-to-noise ratios (SNR): baseband systems, amplitude-modulated signals, angle-modulated signals, optimal design of pre-emphasis/de-emphasis filters, pulse-modulated systems. Behavior of digital communications systems in the presence of noise; probability of bit error: threshold detection, optimal decision criteria, application to binary and *M*-ary communications schemes, ASK, FSK, PSK and DPSK carrier systems, spread-spectrum systems. Information theory: measure of information, Shannon entropy, channel capacity, source encoding. Error detecting and correcting codes: linear block codes, cyclic codes, convolutional codes.

ECE 599          Special Topics: Digital Data Compression (3)  
SEC.   003  
TIME:          Tuesday & Friday          10:45 – 12 noon  
ROOM:          F 253  
PROFESSOR: Dr. Bruce Bomar  
TEXT:          Khalid Sayood: *Introduction to Data Compression*; 2<sup>nd</sup> ed., Morgan Kaufmann, ISBN# 1-55860-558-4

Lossless and lossy data compression techniques and their implementation. Huffman coding, arithmetic coding, dictionary coding, and predictive coding for lossless compression. Vector quantization, transform, subband, analysis/synthesis, and wavelet-based lossy methods. Application to audio and video compression including MP3, H.261, MPEG2 and MPEG4 standards.

### **ENGINEERING SCIENCE (335)**

ES 500          Master's Thesis (1 - 15)  
SEC.   001          Schulz, Roy  
          010          Antar, Basil  
          011          Flandro, Gary  
          012          Majdalani, Joseph  
          013          Moeller, Trevor  
          014          Steinhoff, John  
          015          Vakili, Ahmad

\*ES 534          Mechanical Vibrations **FIRST CLASS MEETS JANUARY 22<sup>ND</sup>**  
SEC.   002          (Same as AE 535/ME 534)  
TIME:          Monday & Thursday          7:45 a.m. – 9:00 a.m.  
ROOM:          E 211  
PROFESSOR: Dr. Gary Flandro  
TEXT:          Lecture notes, handouts, reserved books form the Library

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

ES 539            Continuum Mechanics (3)  
SEC. 001        (Same as AE 539 & ME 539)  
TIME:            Monday & Thursday 10:45 – 12:00  
ROOM:           B 112  
PROFESSOR: Dr. T. H. Moulden  
TEXT:            L. E. Malvern: *Introduction to the Mechanics of a Continuous Medium*; Prentice Hall, ISBN# 13 487603 2

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  
ROOM:           E 211  
PROFESSOR: Dr. Basil Antar  
TEXT:            1. H. Tennekes & J. Lumley: *A First Course in Turbulence*, MIT, Latest Ed  
                    2. R.L. Panton: *Incompressible Flow*; Wiley Interscience; Latest publications

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. 001  
TIME:            TBA  
PROFESSOR: Dr. John Steinhoff

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

ES 600            Doctoral and Research Dissertation (1 – 15)  
SEC. 001        Schulz, Roy  
                    004        Antar, Basil  
                    005        Flandro, Gary  
                    006        Majdalani, Joseph  
                    007        Steinhoff, John  
                    008        Vakili, Ahmad

\*ES 681            Advanced Topics in Engineering Mechanics: Linear and Nonlinear Waves (3) **CANCELLED**  
SEC. 003  
TIME:            Monday & Thursday    4:00 - 5:15  
ROOM:           B 210  
PROFESSOR: Dr. John Steinhoff  
TEXT:            GB. Witham: Linear and Nonlinear Waves  
                    P.C. Drazin & R.S. Johnson: Solitons: An Introduction; ISBN# 0521336554

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. Prereq: include Elementary Partial Differential Equations and Advanced Calculus

### **INDUSTRIAL ENGINEERING: ENGINEERING MANAGEMENT (328)**

EM 501            Capstone Project (3 - 6)  
SEC. 001  
SEC. 002        (Students receiving tapes/CD/interactive use this number)  
PROFESSOR: Dr. Greg 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            Register Use of Facilities (1 – 15)  
SEC. 001  
SEC. 002        (Students receiving CD/interactive use this number)  
PROFESSOR: Dr. Greg 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 534            Financial Management (3)  
SEC. 001        (Video Taped at UTSI)  
SEC. 002        (Students receiving tapes/CD/interactive use this number)  
TIME:            Monday 1:00 – 3:30  
ROOM:           E 113  
PROFESSOR: Dr. George Garrison  
TEXT:            Go to [www.utsi.edu/em](http://www.utsi.edu/em)

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 535            Management of Technology (3)  
SEC. 001        (Video Taped at UTSI)  
SEC. 002        (Students receiving CD/interactive use this number)  
TIME:            Wednesday    4:00 – 6:35 p.m.  
ROOM:           E 113  
PROFESSOR: Dr. Joe Costa

TEXT: [www.utsi.edu/em](http://www.utsi.edu/em)

Creativity and innovation; incorporation of advanced technology equipment; application of systems thinking; new methods in business and manufacturing organizations; justifying technology; assimilating and managing change; changing management roles; and impacts of new technologies. Prereq: 539 and Industrial Engineering 518.

EM 539 Strategic Management (3)  
SEC. 001 (Video Taped at UTSI)  
SEC. 002 (Students receiving CD/interactive use this number)  
TIME: Tuesday 4:00 – 6:30  
ROOM: E 113  
PROFESSOR: TBD  
TEXT: [www.utsi.edu/em](http://www.utsi.edu/em)

Strategic planning processes and strategic management in practice; corporate vision and mission; product, market, organizational, and financial strategies; analysis of internal and external factors; managing core competencies; effective implementation; competitive advantage and beyond. Prereq: 533 and Industrial Engineering 518 or consent of instructor.

### **INDUSTRIAL ENGINEERING (556)**

IE 514 Advanced Information Systems Analysis & Design (3)  
SEC. 003 (Web Based CENTRA from UTK)  
SEC. 004 (Students receiving CD/interactive use this number)  
TIME: Tuesday & Thursday 11:10 – 12:25 (EST) (Live Online from Knoxville)  
ROOM: PER 60 Knoxville  
PROFESSOR: Dr. Denise Jackson  
TEXT: [www.utsi.edu/em](http://www.utsi.edu/em)

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 516 Statistical Methods in IE (3)  
SEC. 003 (Video Taped at UTSI)  
SEC. 004 (Students receiving CD/interactive use this number)  
TIME: Monday 4:00 p.m. - 6:35 p.m.  
ROOM: E 113  
PROFESSOR: Dr. Greg Sedrick  
TEXT: [www.utsi.edu/em](http://www.utsi.edu/em)

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

IE 518 Advanced Engineering Economy  
SEC. 002  
TIME: TBD  
ROOM: TBD  
PROFESSOR: Dr. Greg Sedrick  
TEXT: [www.utsi.edu/em](http://www.utsi.edu/em)

IE 521            Advanced Human Factors Engineering Methodology (3)  
SEC. 005        (Video Taped at UTK)  
SEC. 006        (Students receiving CD/interactive use this number)  
TIME:           Tuesday & Thursday    6:30 – 7:45 EST (Live Online from Knoxville)  
ROOM:          PER 61 Knoxville  
PROFESSOR:    Dr. Robert E. Ford  
TEXT:           [www.utsi.edu/em](http://www.utsi.edu/em)

Advanced methodologies used in human factors engineering. Observational methods; function/task analysis; computerized human factors design methods; human reliability and error prediction; evaluation of human-machine interface; modeling techniques; questionnaire and survey design; experimental design, and other selected topics. Prereq: 519 or consent of instructor.

### **MATERIALS SCIENCE (638)**

MSE 500        Thesis (1 – 15)  
SEC. 002  
PROFESSOR:    Dr. William Hofmeister

MSE 511        Fundamentals of Materials Science and Engineering I (3)  
SEC. 001  
TIME:           Monday & Thursday    9:15 – 10:30  
ROOM:          E 211  
PROFESSOR:    Dr. William Hofmeister  
TEXT:           TBA

Chemical bonding, structures, defects, scattering, thermodynamics, diffusion, phase diagrams, microstructures, and phase transformations.

MSE 600        Direct Doctoral Dissertation (1-15)  
SEC. 002  
PROFESSOR:    Dr. William Hofmeister

### **MATHEMATICS (641)**

MATH 431       Differential Equations II (3)  
SEC. 001  
TIME:           Tuesday & Friday 10:45 – 12 Noon  
ROOM:          B 210  
PROFESSOR:    Dr. T. H. Moulden  
TEXT:           Class Notes

Second course in ordinary differential equations. Linear systems of differential equations, Frobenius method, Sturm-Liouville eigenvalue problems, phase plane analysis. Prereq: Matrix Computations or Matrix Algebra I, and Differential Equations.

MATH 435       Partial Differential Equations (3)  
SEC. 001  
TIME:           Monday & Thursday    9:15 – 10:30  
ROOM:          B 112  
PROFESSOR:    Dr. Boris Kupershmidt

TEXT: Richard Haberman: *Applied Partial Differential Equations with Fourier Services and Boundary Value Problems*; Prentice Hall; 4<sup>th</sup> ed., ISBN# 013-065243-1

Separation of variables, Fourier series, solution of Laplace, wave and heat equations. Prereq: Differential Equations and Calculus III.

MATH 443      Complex Variables I (3)  
SEC.   001  
TIME:       Monday & Thursday   1:00 – 2:15  
ROOM:       B 210  
PROFESSOR: Dr. Boris Kupershmidt  
TEXT:       Murray R Spiegel: *Schaum's Complex Variables*; 29<sup>th</sup> ed or later; McGraw-Hill  
ISBN: 07-060230-1

The basic course with emphasis on applications of complex integration to solve complicated real problems.

MATH 472      Numerical Linear Algebra (3)  
SEC.   004      Videotaped from UTSI  
TIME:       Tuesday & Friday       7:45 a.m. – 9:15 a.m.  
ROOM:       E 113  
PROFESSOR: Dr. Chad Limbaugh  
TEXT:       Burden & Faires: *Numerical Analysis*; 8th ed., Brooks/Cole; ISBN: 0-534-38216-9

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. Prereq: Numerical Algorithms 1 or consent of instructor. Recommended prereq: 453.

MATH 500      Master's Thesis (1 - 15)  
SEC.   001

MATH 518      Mathematical Methods in Physics (3)  
SEC.   001  
TIME:       Monday & Thursday 2:30 – 3:45  
ROOM:       B 210  
PROFESSOR: Dr. Boris Kupershmidt  
TEXT:       G. Arken: *Mathematical Methods for Physicists*; 5<sup>th</sup> ed., Harcourt/Academic  
Press ISBN# 0-12-059825-6

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: Scientific Visualization  
SEC.   001  
TIME:       Monday & Thursday   2:30 – 3:45  
ROOM:       F 252 & B 113  
PROFESSOR: Dr. Ken Kimble  
TEXT:       Schroeder, Martin and Lorensen: *The Visualization Toolkit Textbook*; 3<sup>rd</sup> ,  
Prentice Hall, ISBN# 1-932-34-12-2  
*The VTK User's Guide*: Kitware, Inc.; ISBN# 1-930934-13-0 (Guide)

The computer animation industry has matured to a point that it routinely produces short and full length presentations which effectively portray pseudo-real world events with surprising realism. The techniques and tools are readily available and are often well suited for scientific and mathematical visualization purposes. This course will focus on training students in the use of animation software, specifically Blender, for the purpose of producing scientifically accurate animated sequences. Student projects will provide experience in the specific techniques (such as key-framing, motion paths, and inverse kinematics) as well as the management principles which are required to coordinate a complex effort to produce a timely and effective result.

Course description can be found at [graylag.utsi.edu/animation](http://graylag.utsi.edu/animation)

MATH 575      Matrix Theory and Techniques in Numerical Analysis (3)  
SEC. 002  
TIME:          Monday & Thursday 1:00 – 2:15  
ROOM:         B 112  
PROFESSOR: Dr. K. C. Reddy  
TEXT:          Lloyd N. Trefethen, David Bau III: *Numerical Linear Algebra*, SIAM: Society of Industrial and Applied Mathematics (June 1, 2007), ISBN# 0898713617

Advanced topics in study of iterative and direct methods for large systems of linear equations: sparse matrix analysis, relationship to modern computer architectures. May be repeated. Maximum 9 hours. (Same as Computer Science 575.) Prerequisites: 453, 471, and 472 or consent of instructor.

## **MECHANICAL ENGINEERING (650)**

ME 500          Master's Thesis (1 - 15)  
SEC. 001        Schulz, Roy  
         021        Antar, Basil  
         022        Flandro, Gary  
         023        Majdalani, Joseph  
         024        Moeller, Trevor  
         025        Steinhoff, John  
         026        Vakili, Ahmad

ME 512          Heat Transfer II (3)  
SEC. 001  
TIME:          Tuesday & Friday 1:00 – 2:15  
ROOM:         E 211  
PROFESSOR: Dr. Basil Antar  
TEXT:          Adrain Bejan: *Convection Heat Transfer*; latest ed., John Wiley & Sons, ISBN#0471579726

This course is a continuation of heat transfer, covering convection and thermal radiation heat transfer. Prereq: ME 511 or consent of instructor.

\*ME 514 Phase Change Heat Transfer (3) **CANCELLED**  
SEC. 004  
TIME: Tuesday & Friday 9:15 – 10:30 a.m.  
ROOM: E 210  
PROFESSOR: Dr. Roy Schulz  
TEXT: *Boiling, Condensation, and Gas-Liquid Flow*; Latest ed., Clarendon Press, Oxford  
ISBN# 0-19-856234-9

Mechanisms and modeling of nucleate, transition and film boiling processes; critical heat flux; forced convection boiling and post dry-out heat transfer; condensation processes; heterogeneous nucleation; dropwise and filmwise condensation; flow condensation; liquid-solid phase change processes; moving phase fronts; mathematical modeling. Dept. Prerequisites 344 and 511.

ME 522 Thermodynamics II (3)  
SEC. 001 Videotaped from UTSI  
TIME: Monday & Thursday 9:15 – 10:30 a.m.  
ROOM: E 112  
PROFESSOR: Dr. Frank Collins  
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

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 526 Combustion and Chemically Reacting Flows II (3) **CANCELLED**  
SEC. 001  
TIME: TBA  
PROFESSOR: Dr. H. Ebrahimi  
TEXT: TBA

Advanced topics: phenomenological approaches to turbulent flames; fundamentals of turbulent flow; application of probability density functions to turbulent flames; turbulent reacting flows with premixed and/or non-premixed reactants; spray combustion models; fluidized bed combustion; chemically reacting boundary layer flow; gas turbine and/or rocket motor combustors; furnaces; introduction to supersonic combustion and hypersonic flows.

ME 534 Mechanical Vibrations  
SEC. 002 (Same as AE 535/ES 534)  
TIME: Monday & Thursday 7:45 a.m. – 9:00 a.m.  
ROOM: E 211  
PROFESSOR: Dr. Gary Flandro  
TEXT: Lecture notes, handouts, reserved books form the Library

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

ME 539            Continuum Mechanics (3)  
SEC. 001        (Same as ES 539 & AE 539)  
TIME:           Monday & Thursday 10:45 – 12:00  
ROOM:          B 112  
PROFESSOR: Dr. T. H. Moulden  
TEXT:           L. E. Malvern: *Introduction to the Mechanics of a Continuous Medium*; Prentice Hall, ISBN# 13 487603 2

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.

ME 542            Fluid Mechanics II (3)  
SEC. 001        (Same as AE 542 & ES 542)  
TIME:           Tuesday & Friday 9:15 – 10:30  
ROOM:          E 211  
PROFESSOR: Dr. Basil Antar  
TEXT:           1. H. Tennekes & J. Lumley: *A First Course in Turbulence*, MIT, Latest ed  
                  2. R.L. Panton: *Incompressible Flow*; Wiley Interscience; Latest publications

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 552            Mechanical Design (3)  
SEC. 002  
TIME:           Monday & Thursday    8:00 a.m. – 9:15  
ROOM:  
PROFESSOR: Dr. Louis Deken  
TEXT:           M. F. Spotts: *Design of Machine Elements*; Latest Ed, Prentice-Hall, Inc. ISBN# 0-13-200593-X

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 585            Turbomachinery Systems II (3)  
SEC. 001  
TIME:           Tuesday & Thursday    4:00 – 5:30  
ROOM:          E 112  
PROFESSOR: Dr. Milt Davis  
TEXT:           Jack D. Mattingly: *Elements of Gas Turbine Propulsion*; 1<sup>st</sup> Ed., AIAA Educator Series; ISBN# 1-56347-778-5

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: Monday & Thursday 1:00 – 2:15  
ROOM: F 253  
PROFESSOR: Dr. George Havener  
TEXT: Instructor Notes

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 (3)  
SEC. 001  
TIME: TBA  
PROFESSOR: Dr. Roy Schulz  
TEXT: TBA

Description: Enrollment limited to students in the problems option.

ME 590 Selected Engineering Problems (2-6)  
SEC. 002  
TIME: TBA  
PROFESSOR: Dr. Ahmad Vakili  
ROOM: TBA

ME 595 Seminars: Aerospace & Mechanical Systems (1)  
SEC. 001 (Same as AE 595)  
TIME: To Be Announced  
PROFESSOR: Dr. Ahmad Vakili

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

\*ME 599 Special Topics in ME: Radiation Heat Transfer (3) **CANCELLED**  
SEC. 007 Same as AE 599 Section 00 (Transmitted to UTC)  
TIME: Monday & Wednesday 11:00 a.m. - 12:15 p.m.  
ROOM: E-112  
PROFESSOR: Dr. Houshang Ebrahimi  
TEXT: TBD

Thermal Radiation, Blackbody Radiation, Radiation properties, View factor, Radiation Heat Transfer for Black surfaces, Diffuse, Gray surfaces. Radiation Density and Radiation pressure. Radiation of strongly absorbing media. Gas Radiation Numerical methods for Radiation Heat Transfer.

ME 599 Tactical Missile Design and Analysis (3 hrs.)

SEC 010

TIME: Monday and Thursday 10:45 – 12:00 noon

ROOM F-252

PROFESSORS: Dr. Gary A. Flandro and Paul Gloyer

TEXT: Eugene L. Fleeman, "Tactical Missile Design," Second Edition, AIAA Education Series, 2006, ISBN# 1-56347-782-3

The extreme flight environments of tactical missiles pose substantial challenges to the missile design engineer. This course will examine these challenges and explore the various options and approaches to design modern tactical missiles. During the course, students will develop a conceptual design of a modern tactical missile. Basic design procedures will be extended to missile defense system strategy, a special case of tactical missile design requiring advanced technology.

ME 599, "Statistical Mechanics with Applications to Modeling Fundamental Properties of Materials," (3)

SEC. 013 (Same as Phys 551 001)

TIME: TBA

PROFESSOR: Dr. Chris Parigger

TEXT: 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-f1.ijs.si/~vilfan/SM/> and/or a collection of texts at <http://www.cpth.polytechnique.fr/cpth/chazottes/booksOnline.html#Cref>

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. (DE) Prerequisite(s): 521, 531, and 571.

ME 600 Doctoral & Research Dissertation (3 - 15)

SEC. 001 Schulz, Roy

016 Antar, Basil

018 Majdalani, Joseph

020 Vakili, Ahmad

022 Steinhoff, John

## PHYSICS (773)

PHYS 500 Master's Thesis (1 - 15)

SEC. 002 Dr. Horace Crater

003 Dr. Jim Lewis

004 Dr. Lloyd Davis

005 Dr. C. Parigger

006 Dr. Y. Chen

PHYS 501 Graduate Research Participation (3)

SEC. 003

TIME: TBA

PROFESSOR: Dr. Y. Chen

TEXT: TBA

PHYS 503      Physics Colloquium (1)  
SEC    003  
PROFESSOR: Dr. Horace Crater  
TIME: TBA  
TEXT: TBA

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

PHYS 514      Problems in Theoretical Physics II (4)  
SEC.    002      (Interactive Transmission from Knoxville)  
TIME:      Wednesday    10:15 – 11:30  
ROOM:      E 113  
PROFESSOR: Dr. Marianne Breinig  
TEXT:      Core Concepts in Physics

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    9:15 – 10:30  
ROOM:      B 210  
PROFESSOR: Dr. Horace Crater  
TEXT:      Sakurai: *Quantum Mechanics*; Addison Wesley

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. Prereq: 521.

PHYS 551,      "Statistical Mechanics," (3 ) (Same as ME 599 013)  
SEC.    001  
TIME: TBA  
PROFESSOR: Dr. Chris Parigger

TEXT: 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-f1.ijs.si/~vilfan/SM/> and/or a collection of texts at <http://www.cpht.polytechnique.fr/cpth/chazottes/booksOnline.html#Cref>

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. (DE) Prerequisite(s): 521, 531, and 571.

PHYS 572      Mathematical Methods in Physics (3)  
SEC.    001      Video Taped at UTSI

TIME: Monday & Thursday 2:30 - 3:30  
ROOM: E 112  
PROFESSOR: Dr. Horace Crater  
TEXT: G. B. Arfken & H. J. Weber: *Mathematical Methods for Physicists*, Fifth Edition, ISBN# 0-12-059825-6  
H.J. Weber & G. B. Arfken: *Essential Mathematical Methods for Physicists*, ISBN#0-12-059877-9 classic books on mathematical methods including Classical Mechanics, Electrodynamics and Quantum Mechanics.

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.

PHYS 593 Physics Seminar (1 - 3)  
SEC. 001  
TIME: 2nd & 4th Monday & Thursday 3:30 – 5:00  
ROOM: CLA Conference Room  
PROFESSOR: Dr. Horace Crater

Physics seminar presentations of current topics of interest by students, faculty, and invited speakers. REQUIRED OF ALL PHYSICS STUDENTS

PHYS 593 Independent Study (1 - 15)  
SEC. 002  
TIME: TBD  
ROOM: TBD  
PROFESSOR: Dr. Ying Ling Ann Chen

Independent study.

\*PHYS 593 Independent Study: Dirac's Covariant Constraint Dynamics (3) **CANCELLED**  
SEC 004  
PROFESSOR: Dr. Horace Crater  
TIME: TBA  
TEXT: TBA

PHYS 594 Special Problems: Biophotonics (3)  
SEC. 004  
TIME: TBA  
ROOM: TBA  
PROFESSOR: Dr. Lloyd Davis  
TEXT: "Introduction to Biophotonics" by Paras N. Prasad,

Prasad, [http://www.amazon.com/Introduction-Biophotonics-Paras-N-Prasad/dp/0471287709/sr=1-1/qid=1165598296/ref=sr\\_1\\_1/103-4038373-3413449?ie=UTF8&s=books](http://www.amazon.com/Introduction-Biophotonics-Paras-N-Prasad/dp/0471287709/sr=1-1/qid=1165598296/ref=sr_1_1/103-4038373-3413449?ie=UTF8&s=books) and several other texts and material from the scientific literature.

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

PHYS 600      Doctoral & Research Dissertation (3 - 15)  
SEC. 001      Dr. Horace Crater  
      003      Dr. Jim Lewis  
      004      Dr. Lloyd Davis  
      005      Dr. C. Parigger  
      006      Dr. Y. Chen

PHYS 605      ADVANCED TOPICS: LASER SPECTROSCOPY (3)

SEC. 001

TIME:            Tuesday & Friday      TBD

ROOM:            CLA Laboratories

PROFESSOR: Dr. Christian Parigger

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

Applications of lasers to spectroscopy of atomic and molecular systems; absorption, laser-induced fluorescence, and Raman spectroscopy; molecular and atomic coherence, quantum beats, resonance fluorescence, photon echoes, self-induced transparency; saturation and Doppler-free spectroscopy; laser cooling and trapping. Prereq: 521, 541.

\*PHYS 606      Nonlinear Optics (3)      **CANCELLED**

SEC. 001      (Videotaped at UTSI)

TIME:            Wednesday      8:15 a.m. - 9:45 a.m.

ROOM:            E 112

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. Prereq: 522.

PHYS 611      Advanced Quantum Mechanics and Field Theory (3)

SEC. 003

TIME:

ROOM:            TBD

PROFESSOR: Dr. Christian Parigger

TEXT: TBD

Survey of problems and methods. Topics of current interest. Intended for all graduate students.

PHYS 626 Elementary Particle Physics (3)  
SEC. 004  
TIME: TBA  
PROFESSOR: Dr. Horace Crater  
TEXT: TBA

Survey of elementary particle physics: experimental methods, conservation laws, invariance principles, and model of interactions.

\*PHYS 627 Elementary Particle Physics (3) **CANCELLED**  
SEC 001  
PROFESSOR: Dr. Horace Crater  
TIME: TBA  
TEXT: TBA

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

PHYS 642 Advanced Topics in Modern Physics (3)  
SEC. 001  
TIME:  
ROOM: ATL/CLA Laboratories  
PROFESSOR: Dr. Christian Parigger  
TEXT: TBD

Advanced theoretical or experimental topics not covered in other courses. May be repeated with consent of department. Maximum 9 hrs.

PHYS 642 Advanced Topics in Modern Physics (3)  
SEC. 003  
TIME: TBA  
PROFESSOR: Dr. Jim Lewis  
TEXT: TBA

Advanced theoretical or experimental topics not covered in other courses

PHYS 642 Independent Study: Dirac's Covariant Constraint Dynamics (3)  
SEC. 004  
TIME: TBA  
PROFESSOR: Dr. Horace Crater  
TEXT: TBA

## **STATISTICS (962)**

STAT 251 Probability and Statistics (3)

SEC. 001 (Video Taped at UTSI)  
SEC. 002 (Students receiving tapes/CD/interactive use this number)  
TIME: Monday 4:00 - 6:35  
ROOM: E 113  
PROFESSOR: Dr. K.C. Reddy  
TEXT: [www.utsi.edu/em](http://www.utsi.edu/em)

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. Prereq: or Coreq: MATH 241.