The University of Tennessee
Space Institute

Spring 2015
Registration Announcement

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

www.utsi.edu
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CALENDAR - 2015 SPRING SEMESTER

Priority Registration.................................................. October 13, 2014
Admission to Candidacy Forms for Spring 2015 Commencement .......... December 2, 2014
Spring 2014 Graduation Application Deadline (submit online) .......... December 2, 2014
Graduation Fee Payment Deadline (MS $30, PhD $75)................. December 2, 2014
Payment Due for Priority Registration............................................. January 5, 2015
Late Registration and late fees begin ................................................... January 7 - 16, 2015
Classes begin............................................................................................................. January 7, 2015
Last Day to final register, add, change grading options or drop without a “W”...January 16, 2015
Martin Luther King Holiday ................................................................. January 19, 2015
Last day to schedule final exam (non-thesis/thesis/dissertation) ............ March 13, 2015
Register to attend the Graduate Hooding Ceremony (http://gradschool.utk.edu).... March 13, 2015
Purchase cap and gown and order hood (865-974-3459)........................ March 13, 2015
Spring Break (No Classes)................................................................................ March 16 - 20, 2015
Spring Recess (No Classes) ................................................................. March 16 - 20, 2015
Drop with a “W”............................................................................................... March 31, 2015
Last day to take final exam (non-thesis/thesis/dissertation) ...................... April 1, 2015
Thesis/Dissertation Deadline 5:00 p.m. EST ................................................... April 17, 2015
Submit report of final examination (Pass/Fail) form............................... April 17, 2015
Deadline for Submission of Admission to Candidacy for students
  Graduating Summer 2015 and Graduation Application.......................... April 24, 2015
All "INCOMPLETE" must be removed for Graduation........................... April 24, 2015
Classes End............................................................................................................. April 24, 2015
Total Withdraw from the University Deadline .......................................... April 24, 2015
Study Period......................................................................................................... April 27, 2015
Exam Period........................................................................................................ April 28, 29 & April 30, 2015
Graduate Hooding Ceremony (UTK) ......................................................... May 7, 2015
COMMENCEMENT (UTK) ............................................................................. May 6 - 9, 2015
Official Graduation Date.................................................................................. May 9, 2015

Second thesis/dissertation deadlines
  Defense Completed by April 24, 2015
  Second Deadline Application Submitted by April 24, 2015
    http://gradschool.utk.edu/forms/Second%20Deadline%20Graduation%20Application.pdf
    (Student will receive diploma summer 2015 semester, but will not be required to register for
    thesis/dissertation credits)

SUMMER SEMESTER 2015

Priority Registration.................................................................................. TBD
Final Registration......................................................................................... TBD
Memorial Day Holiday .................................................................................. May 25, 2015
Classes begin.................................................................................................. June 1, 2015
July 4th Holiday............................................................................................. July 3, 2015
Classes End..................................................................................................... August 6, 2015
Summer Graduation Date on Transcript (No Ceremony)......................... August 14, 2015

Dates may be revised without notice. Please refer to the following sites for updates:
http://gradschool.utk.edu/ddategraduation.shtml
http://registrar.tennessee.edu/academic_calendar/index.shtml
SPRING SEMESTER 2015
FINAL STUDY DAY AND EXAM SCHEDULE

LAST DAY OF CLASSES................................................................. April 24, 2015
STUDY PERIOD ................................................................................. April 27, 2015

FINAL EXAMS

<table>
<thead>
<tr>
<th>REGULAR CLASS TIME</th>
<th>EXAM TIME</th>
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<tbody>
<tr>
<td>(Same Classroom)</td>
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1st Day – Tuesday, April 28, 2015

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<thead>
<tr>
<th>7:45 - 9:00</th>
<th>M/Th</th>
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<tbody>
<tr>
<td>10:45 - 12:00</td>
<td>M/Th</td>
<td>10:15 - 12:15</td>
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<tr>
<td>9:15 - 10:30</td>
<td>M/Th</td>
<td>1:00 - 3:00</td>
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<tr>
<td>2:30 - 3:45</td>
<td>M/Th</td>
<td>3:30 - 5:30</td>
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2nd Day – Wednesday April 29, 2015

<table>
<thead>
<tr>
<th>9:15 - 10:30</th>
<th>Tu/Fri</th>
<th>7:45 - 9:45</th>
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<tbody>
<tr>
<td>10:45 - 12:00</td>
<td>Tu/Fri</td>
<td>10:15 - 12:15</td>
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<tr>
<td>1:00 - 2:15</td>
<td>Tu/Fri</td>
<td>1:00 - 3:00</td>
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<tr>
<td>2:30 - 3:45</td>
<td>Tu/Fri</td>
<td>3:30 - 5:30</td>
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3rd Day – Thursday April 30, 2015

<table>
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<tr>
<th>7:45 - 9:00</th>
<th>Tu/Fri</th>
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<td>1:00 - 2:15</td>
<td>M/Th</td>
<td>10:15 - 12:15</td>
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**** ATTENTION ****

ALL STUDENTS TAKING VIDEOTAPE COURSES
CONTACT INSTRUCTOR FOR DATE AND TIME OF FINAL EXAM

NO CLASSES WILL BE IN SESSION
AT THIS TIME
NEW STARTING SPRING 2015 – CREDIT CARD PAYMENTS

The UTSI Budget and Finance Accounts Receivable Office will no longer accept payment for tuition and fees by credit card starting Spring 2015. All students will need to login to MyUTK One Stop to make secure payments online. Please see One Stop - Paying Tuition and Fees webpage for more details http://onestop.utk.edu/pay/.

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

REGISTRATION PROCEDURE

GRADUATE ACADEMIC ADVISING
Graduate students should contact your departmental faculty to arrange an advising appointment. If you’re not accepted into a specific program, the assistant to the dean of graduate studies or the designee may act as your advisor. When the web registration system asks if you’ve discussed your program with your advisor, you must answer yes to continue with the registration process.

REGISTRATION

Students will register at http://my.utk.edu. You will need to log in using your NetID and your NetID password. If you do not know your NetID and NetID password, go to http://onestop.utk.edu/your-classes/registering-for-classes/.

*Log in to MyUTK. You can find a link by looking under “M” on the A-Z index (http://www.utk.edu/alpha/) or by typing myutk.utk.edu directly into your browser. You will need to log in by typing utk/your NetID in the “username” field and then your NetID password in the “password” field.

*Before you attempt to register, clear and pay any financial holds (parking tickets, library fines, fees, etc.).

*Look under the “For Your Review” heading on the MyUTK portal page (located in the upper right-hand corner) for notification of any holds you may have.

*Once you are logged into “My UTK,” scroll down to “UTK Student Registration Links.” Click on “Search for Classes” to look up sections and then register.

*Print a copy of your schedule when you are finished registering.

If you have any questions, call the Office of the University Registrar at 865-974-2101 or contact Charlene Hane in Student Services room A-206, phone 931-393-7228, email chane@utsi.edu.
TOLL-FREE NUMBERS

For a specific office: 1-888-822-UTSI (8874) and the extension number.
For general information: 1-888-822-UTSI (8874)
Admissions Office: 1-888-822-UTSI (8874)-37213
Budget and Finance Office: 1-888-822-UTSI (8874)-37297
Student Services 1-888-822-UTSI (8874)-37228

APPLICATION FOR ADMISSION

No student will be allowed to register unless a completed Application for Admission to the Graduate School of the University of Tennessee, Knoxville (UTK) is on file in the Registrar's Office. An Application for Admission to the UTK Graduate School should be completed online at https://www.applyweb.com/utg and must be accompanied by a $60.00 non-refundable application fee, payable to The University of Tennessee Space Institute. All applicants are required to provide one official transcript of all undergraduate and graduate records, GRE test scores and 3 letters of recommendation when applying. International applicants will also need to include TOEFL scores. Please select UT Space Institute if your plans are to attend the Tullahoma campus location. Only online applications will be accepted by Graduate Admissions Knoxville, TN.

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

TOTAL WITHDRAWAL FROM THE UNIVERSITY

If, after registering for classes and either returning your fee payment or your Confirmation of Attendance form to the Bursar’s Office, you decide not to enroll for this term, you must immediately notify Charlene Hane, Student Services, at UTSI. If you withdraw officially on or before a Change of Registration deadline, but after the no “W” deadline for a particular session, the grade of “W” will be issued.

GRADES

Students may obtain their grades through the web at MyUTK or contact Charlene Hane, Student Services, Office A-206, (931) 393-7228.

GRADUATE STUDENTS CHANGE OF REGISTRATION AFTER THE DEADLINE

To change registration in any way after the deadline, a graduate student must present a request, signed by the instructor(s) and adviser as evidence of their knowledge of the request to Charlene Hane, Student Services at UTSI. Graduate students must verify that ALL changes have been approved by their academic adviser. If the Office of Graduate Student Services approves the change of registration, the change will be noted on the student’s permanent record. THE DROP DEADLINE FOR GRADES AND THE DROP DEADLINE FOR FEE REFUNDS ARE NOT THE SAME.
FULL-TIME STUDENTS

Students enrolled in at least 9 semester hours during the Fall/Spring semesters or 6 hours in the Summer term are considered full-time students. Research Assistants must be full-time students and also enroll in one of the MABE 595 seminars or a PHYS 599 seminar each term, unless a waiver is granted by the Associate Executive Director.

REMOVAL OF INCOMPLETE GRADES

All Incomplete Grades (I) must be removed prior to graduation. The instructor, in consultation with the student, decides the terms for the removal of the I, including the time limit for removal. If the I is not removed within one calendar year, the grade will be changed to an F. The course will not be counted in the cumulative grade point average until a final grade is assigned. No student may graduate with an I on the record. Students planning to graduate Spring Semester 2015 must remove all INCOMPLETE GRADES by April 24, 2015. Contact Charlene Hane, Student Services, to remove an Incomplete Grade.

REPEATING A COURSE

No graduate student may repeat a course for the purpose of raising a grade already received, with the exception of a NC course. A graduate student cannot do additional work nor repeat an examination to raise a final grade.

ADMISSION TO CANDIDACY

MASTER OF SCIENCE DEGREE:
Each M.S. student, including IE Capstone Project students, is responsible for submitting a completed and signed Admission to Candidacy Application at least one semester prior to receiving the degree.

Candidacy committee changes or course changes must be submitted to the committee chairman using a Revision form. If changing from a thesis option to a non-thesis option or vice versa, a new Admission to Candidacy Application must be submitted. All forms must be processed through Student Services.

DOCTORAL DEGREE:

A Doctoral Committee should be formed during the student's first year of doctoral study. Any changes to the doctoral committee (deletions or additions) must be submitted to the Committee Chairman using a Revision form for approval. Each doctoral student is responsible for submitting a completed Admission to Candidacy form signed by the doctoral committee at least one semester prior to receiving the degree. All forms must be processed through Student Services.

CONTINUOUS ENROLLMENT

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

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

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

CONSEQUENCES OF NON-ENROLLMENT WITHOUT LEAVE OF ABSENCE

Graduate students who do not maintain continuous enrollment as stipulated in the "Continuous Enrollment" policy will lose their active student status. A student who has lost his or her active status without having been granted a Leave of Absence for the period of non-enrollment ahead of time will not be allowed to continue in his her graduate program until readmitted. (see policy on "Readmission" in the Graduate Catalog for more details).

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

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

FINAL EXAM FOR NON-THESIS, CAPSTONE PROJECT STUDENTS, THESIS AND DISSERTATION STUDENTS

A candidate presenting a thesis or dissertation must pass a final oral examination on all work offered for the degree. The examination is scheduled through Student Services. Failure to notify Student Services of the examination date will put the student at risk for graduating that semester. Final examinations not properly scheduled MUST be repeated. The final draft of the thesis must be distributed to the committee members at least two weeks prior to the date of the final examination. In case of a grade of "Fail", the candidate may not apply for re-examination until the following semester. The result of the second examination is final.

UT POLICY ON INSURANCE FOR INTERNATIONAL STUDENTS

All foreign national students registered with the University of Tennessee, Knoxville, are required to have comprehensive medical insurance. The policy for the 2014-2015 academic year is provided by United HealthCare Student Resources. The premium must be paid before registration. Contact the Human Resources Office (room C-106 ext. 37267) for further information.

GENERAL SEMINAR

A number of seminars of interest to all UTSI students and general public will be offered throughout the semester.
FINAL EXAM DATES

STUDY PERIOD – April 27, 2015
FINAL EXAMS – April 28, 29, & 30, 2015

FINANCIAL CALENDAR, FEES, REFUNDS, AND TUITION

Please click FEES link to the most current information. You may also contact Jennifer Boyles in the Business and Finance Office at jboyles@utsi.edu or phone number 931-393-7297.

HONOR STATEMENT

The following Honor Statement is signed by all students applying to The Graduate School:

"An essential feature of The University of Tennessee, Knoxville is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the University, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity."

For official information on all UTK Graduate School policies, refer to the current UTK Graduate Catalog available at http://catalog.utk.edu. The student handbook “Hilltopics” is available in Student Services, D-100 or online at http://dos.utk.edu/hilltopics/.

The University of Tennessee Space Institute reserves the right to cancel any class with an insufficient number of students, or for other reasons.

THE UNIVERSITY OF TENNESSEE POLICY ON A DRUG-FREE CAMPUS AND WORKPLACE

In support of the Drug-Free Workplace Act of 1998 (Public Law 100-690) and the Drug-Free Schools and communities Act of 1989, the University of Tennessee is notifying all students, faculty, and staff of the following university policy approved by the UT Board of Trustees on 21 June 1990.

It is the policy of the University of Tennessee to maintain a safe and healthful environment for its students and employees. Therefore, university policy prohibits the unlawful use, manufacture, possession, distribution, or dispensing of drugs ("controlled substances" as defined in the Controlled Substances Act, 21 U.S.C. 812) and alcohol on university property or during university activities.

Violation of this policy is grounds for disciplinary action--up to and including immediate discharge for an employee and permanent dismissal of a student. Federal and state laws provide additional penalties for such unlawful activities, including fines and imprisonment (21 U.S.C. 841 et seq.; T.C.A. 39-6-401 et seq.). Local ordinances also provide various penalties for drug- and alcohol-related offenses. The university is bound to take all appropriate actions against violators, which may include referral for legal prosecution or requiring the individual to participate satisfactorily in an approved drug use or alcohol abuse assistance or rehabilitation program.
THE UNIVERSITY RESERVES THE RIGHT TO REVISE ANY INFORMATION LISTED IN THIS TIMETABLE OF CLASSES

The University of Tennessee Space Institute
Spring 2015 Course Listings

AEROSPACE ENGINEERING

AE  500  Master’s Thesis (1-15)
SEC.  009 CRN 24511  Abedi
      011 CRN 24512  Antar
      012 CRN 24513  Anusonti-Inthra
      013 CRN 24514  Majdalani
      014 CRN 24515  Moeller
      015 CRN 24516  Solies
      016 CRN 24517  Vakili
      021 CRN 24522  Zhang
      022 CRN 25707  Schmisseur

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

AE  502  Registration for Use of Facilities (1-15)
SEC.  002 CRN 24524  Moeller

Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated.
Credit Restriction: May not be used toward degree requirements.
Credit Level Restriction: Graduate credit only.
Registration Restriction(s): Minimum student level – graduate

AE  517  Finite Elements for Engineering Applications (3)
SEC.  001 CRN 28919  (Same as ME 517 001 CRN 28886)
       ISBN: 9780979004902
TIME:  Monday & Wednesday  8:40 – 9:55  E-110
PROF:  Dr. Reza Abedi

Modern computational theory applied to conservation principles across the engineering sciences. Weak forms, extremization, boundary conditions, discrete implementation via finite element, finite difference, finite volume methods. Asymptotic error estimates, accuracy, convergence, stability. Linear problem applications in 1, 2 and 3 dimensions, extensions to non-linearity, non-smooth data, unsteady, spectral analysis techniques, coupled equation systems. Computer projects in heat transfer, structural mechanics, mechanical vibrations, fluid mechanics, heat/mass transport.
Cross-listed: (Same as Mechanical Engineering 517)
Comment(s): Bachelor’s degree in engineering or natural science required.
Registration Permission: Consent of instructor.

*AE  518  Computational Fluid Dynamics (3)  CANCELLED
SEC.  002  CRN  30818  (Same as BME 518 002 CRN 30820; ME 518 002 CRN 30819)
TEXT:  TBD
TIME:  Tuesday & Thursday  8:40 – 9:55  E-110
PROF:  Dr. Eivanc Ekici


Cross-listed: (Same as Biomedical Engineering 518; Mechanical Engineering 518.)
Recommended Background: Fluid mechanics, differential equations, and compressible flows.
Registration Permission: Consent of instructor.

AE  522  Aerodynamics of Compressible Fluids II (3)
SEC.  001  CRN  26276
        Visit Amazon’s H. W. Liepmann Page
TIME:  Monday & Wednesday  1:10 – 2:35  F-252
PROF:  Dr. Trevor Moeller

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

*AE  532  Introduction to Turbulence (3)  CANCELLED
SEC.  001  CRN  30840
TEXT:  TBD
TIME:  Tuesday & Thursday  10:10 – 11:25  E-114
PROF:  Dr. John Schmisseur

Macroscopic effects, analogies, statistical treatment, correlation functions, energy spectra, diffusion; application of turbulent jets and pipe flow.
(DE) Prerequisite(s): 511 and 512.

AE  535  Mechanical Vibrations (3)
SEC.  003  CRN  29385  (Same as ME 534 003 CRN 29386)
TEXT:  TBD
TIME:  Monday & Wednesday  10:10 – 11:25  E-110
PROF:  Dr. Stephanie TerMaat

Cross-listed: (Same as Mechanical Engineering 534)  
Recommended Background: An undergraduate vibrations course.

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<th>Course Code</th>
<th>Course Name</th>
<th>Section</th>
<th>CRN</th>
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<tbody>
<tr>
<td>AE 542</td>
<td>Fluid Mechanics II (3)</td>
<td>001</td>
<td>24528</td>
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<tr>
<td></td>
<td><strong>TIME:</strong> Thursday 7:30 – 10:00</td>
<td></td>
<td>E-210</td>
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<td><strong>PROF:</strong> Dr. Steven Brooks</td>
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*(Cross-listed: (Same as Mechanical Engineering 542.)) *(DE) Prerequisite(s): 541.*

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<tbody>
<tr>
<td>AE 566</td>
<td>Electric Propulsion (3)</td>
<td>001</td>
<td>30618</td>
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<tr>
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<td><strong>TEXT:</strong> Physics of Electric Propulsion (textbook is available from Amazon.com); Robert G. Jahn; Dover Publications (May 26, 2006); ISBN 10:0486450406; 13: 978-0486450407</td>
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<td><strong>TIME:</strong> Tuesday &amp; Friday 1:30 – 2:30</td>
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<td>E-210</td>
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<td><strong>PROF:</strong> Dr. Trevor Moeller</td>
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Engineering concepts of electric propulsion and its application to modern satellites and deep space probes. Topics include physical principles, practical designs, and performance levels of electrically-powered space propulsion thrusters including: ion engines; pulsed and steady-state (fixed field) plasma and MHD thrusters, including Hall Thrusters, and others.  
*Recommended Background: Rocket propulsion.*  
*Registration Permission: Consent of Instructor.*

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<th>Course Name</th>
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<tr>
<td>AE 590</td>
<td>Selected Engineering Problems (2-6)</td>
<td>001</td>
<td>24530</td>
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<td>003 CRN 24531 Antar</td>
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<td>004 CRN 26279 Anusonti-Inthra</td>
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<td>005 CRN 26280 Majdalani</td>
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<td>006 CRN 26281 Moeller</td>
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<td>007 CRN 26282 Solies</td>
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<td>008 CRN 26283 Vakili</td>
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<td>009 CRN 26284 Zhang</td>
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*Repeatedly: May be repeated. Maximum 6 hours.*  
*Comment(s): Enrollment limited to students in problems option.*  
*Registration Permission: Consent of advisor.*

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<th>Course Code</th>
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<tr>
<td>AE 595</td>
<td>Aerospace Engineering Seminar (1)</td>
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<td><strong>TEXT:</strong> None</td>
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<td><strong>TIME:</strong> Will be announced through email</td>
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<td><strong>PROF:</strong> Dr. Ahmad Vakili</td>
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All phases of aerospace engineering, reports on current research at the University of Tennessee, Knoxville, and UT. 
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 20 hours.

AE 599 Special Topics in AE: Atmospheric Sciences for AE and ME (3)
SEC. 001 CRN 24534 (Same as ME 599 002 CRN 27956)
TIME: Monday & Wednesday 10:10 – 11:25 E-114
PROF: Dr. Steve Brooks

Structure of the atmosphere, energy balance, turbulent boundary layer, solar forcing, satellite drag, aero-maneuvers and de-orbits, and hypersonic flight in the upper atmosphere. These will be extended to the Venusian, Martian and Jovian atmospheres.
Repeatability: May be repeated. Maximum 6 hours.

*AE 599 Special Topics in AE: Intro to Fluid Structure Interactions (3) CANCELLED
SEC. 003 CRN 27955 (Same as ME 599 005 CRN 28025)
TEXT: Recommended material: ANSYS Fluid-Structure Interaction Simulation Guides
TIME: Tuesday & Thursday 1:10 – 2:25 E-110
PROF: Dr. Phuriwat Anusonti-Inthra

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

AE 599 Special Topics in AE: Aircraft Flight Controls (Same as AVSY 516 001 CRN 24611) (3)
SEC. 005 CRN 26116 (Not Video Recorded)
TIME: Wednesday 3:00 – 5:30 E-111
PROF: Dr. Peter Solies

Static and dynamic longitudinal, directional, and lateral stability of aerospace vehicles will be investigated. Topics include contribution of vehicle components to stability and control, motion with fixed and free control surfaces, steady flight and maneuvering flight, flight test techniques, and introduction to control theory and design of automatic controls.
Repeatability: May be repeated. Maximum 6 hours.

AE 599 Aircraft Design (Same as AVSY 506 001 CRN 24608) (3)
SEC. 013 CRN 30797 (Not Video Recorded)
TIME: Tuesday & Friday 1:00 – 2:15 E-111
PROF: Dr. Peter Solies

Design process, compromise of conflicting requirements, economical, industrial, and legal aspects. Definition of mission requirements, synthesis and optimization techniques, safety and reliability, systems integration, standards and regulations, teamwork, and decision-making process.
Repeatability: May be repeated. Maximum 6 hours.

AE  599  Experimental Flight Mechanics: Fixed Wing Performance (3)
SEC.  014  CRN  30799  (Same as AVSY 521 001 CRN 24612)
TIME:  Tuesday & Friday  10:30 – 11:45  Airport Classroom
PROF:  Dr. Peter Solies

Fundamental theories, flight test techniques, and data collection and analyses for fixed wing aircraft performance. Topics: air data system calibration, takeoff and landing performance, turn performance, cruise performance, energy concepts, and aerodynamic modeling. Weekly classroom academics with approximately 4-6 flight labs.

(RE) Prerequisite(s): 503 or Aerospace Engineering 515.
Repeatability: May be repeated. Maximum 6 hours.

AE  599  Special Topics in AE: Introduction to Micro/Nano Manufacturing (3)
SEC.  015  CRN  30801  (Same as BME 599 007 CRN 30831; ME 599 015 CRN 30802)
TEXT:  Provided by instructor
TIME:  Tuesday & Thursday  2:40 – 3:55  E-110
PROF:  Dr. Anming Hu and Dr. Feng-Yuan Zhang

Fundamentals of micro-nano-manufacturing with an emphasis on the relationships between unique functions of micro-nano-materials, designed architectures, and appropriate manufacturing strategies will be discussed. This course will well blend the knowledge of nanotechnology, advanced manufacturing and additive manufacturing (3D printing). Students will conduct independent literature review research on micro-nano-manufacturing techniques they selected. The group project will be conducted in the Instructor labs.

This interactive course is designed for both undergraduate and graduate students.
Prerequisites and Co-requisites:
Basics of manufacturing sciences and mechanical engineering will be required. If in doubt, please ask instructor for approval. Number of seats will be limited to 15 for effective group projects at the Instructor’s lab.
Major: Open to all Engineering Majors [seniors and graduate students]
Repeatability: May be repeated. Maximum 6 hours.

AE  600  Doctoral Research/Dissertation (3-15)
SEC.  006  CRN  24541  Abedi
007  CRN  24542  Antar
008  CRN  24543  Anusonti-Inthra
009  CRN  24544  Flandro
010  CRN  24545  Majdalani
013  CRN  24548  Moeller
015  CRN  26285  Solies
017  CRN  24550  Vakili
018  CRN  25994  Zhang
019  CRN  30865  Schmisseur

Grading Restriction: P/NP only.
Repeatability: May be repeated.
Registration Restriction(s): Minimum student level – graduate.
Methods of planning and conducting original research and proposal writing.  
Registration Restriction(s): Minimum student level – graduate / doctoral students.  
Registration Permission: Departmental approval.

*AE  681  Advanced Viscous Flow Theory (3) CANCELLED  
SEC.  001 CRN  30805  
TEXT: Handouts will be provided  
TIME: Monday & Thursday      1:00 – 2:15       E-211  
PROF: Dr. Ahmad Vakili

(DE) Prerequisite(s): 512, continuum mechanics, and Mathematics 562.  
Registration Restriction(s): Minimum student level – graduate.

AVIATION SYSTEMS

AVSY  500  Master’s Thesis (1-15)  
SEC.  001 CRN  24600  Brooks  
  003 CRN  24601  Martos  
  004 CRN  24602  Solies

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

AVSY  502  Registration for Use of Facilities (1-15)  
SEC.  001 CRN  24604  Brooks  
  003 CRN  24605  Martos  
  004 CRN  24606  Solies

Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.  
Grading Restriction: Satisfactory/No Credit grading only.  
Repeatability: May be repeated.  
Credit Restriction: May not be used toward degree requirements.  
Credit Level Restriction: Graduate credit only.  
Registration Restriction(s): Minimum student level – graduate.

AVSY  506  Aircraft Design (Same as AE 599 013 CRN 30797) (3)  
SEC.  001 CRN  24608  (Not Video Recorded)
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.

AVSY 516 Aircraft Flight Controls (Same as AE 599 005 CRN 26116) (3)
SEC. 001 CRN 24611 (Not Video Recorded)
TIME: Wednesday 3:00 – 5:30 E-111
PROF: Dr. Peter Solies

Static and dynamic longitudinal, directional, and lateral stability of aerospace vehicles will be investigated. Topics include contribution of vehicle components to stability and control, motion with fixed and free control surfaces, steady flight and maneuvering flight, flight test techniques, and introduction to control theory and design of automatic controls.

AVSY 521 Experimental Flight Mechanics: Fixed Wing Performance (3)
SEC. 001 CRN 24612
TIME: Tuesday & Friday 10:30 – 11:45 Airport Classroom
PROF: Dr. Peter Solies

Fundamental theories, flight test techniques, and data collection and analyses for fixed wing aircraft performance. Topics: air data system calibration, takeoff and landing performance, turn performance, cruise performance, energy concepts, and aerodynamic modeling. Weekly classroom academics with approximately 4-6 flight labs.

(RE) Prerequisite(s): 503 or Aerospace Engineering 515.

*AVSY 526 Introduction to Avionics II (3) CANCELLED
SEC. 001 CRN 28882 (Video Recorded)
TEXT: Principles of Avionics; 7th Edition or latest; Albert Helfrick; Avionics Communications (http://www.avionics.com); ISBN 13:9781885544278
TIME: TBD
PROF: Dr. Monty Smith

Electronic instrumentation, navigation, communication, guidance and control systems used in aviation. The primary topics to be covered in the second semester include: surveillance systems, airborne communication systems, onboard communications, indicators, air data sensors, and flight control systems.

(DE) Prerequisite(s): 525.

AVSY 550 Project in Aviation Systems (3)
SEC. 001 CRN 24613 Brooks
003 CRN 24614 Martos
004 CRN 24615 Solies
Repeatability: May be repeated. Maximum 15 hours.
Credit Restriction: Maximum of 3 hours may be applied toward degree requirements.
Comment(s): Non-thesis aviation systems majors only.
Credit Level Restriction: Graduate credit only.
Registration Restriction(s): Minimum student level - graduate.

BIOMEDICAL ENGINEERING

BME  500  Master’s Thesis (1-15)
SEC. 012  CRN  26938  Johnson

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

*BME  518  Computational Fluid Dynamics (3)  CANCELLED
SEC. 002  CRN  30820  (Same as AE 518 002 CRN 30818; ME 002 CRN 30819)
TEXT:  TBD
TIME: Tuesday & Thursday 8:40 – 9:55  E-110
PROF: Dr. Eivanc Ekici

Finite difference and finite volume techniques for solving compressible and incompressible fluid flow problems. Classification of partial differential equations and their discrete approximations. Explicit and Implicit techniques for solving unsteady Euler and Navier-Stokes equations including finite volume and finite difference formulations. Formulation of boundary conditions, artificial viscosity and multigrid acceleration. Stability analysis and convergence. Grid generation. Cross-listed: (Same as Aerospace Engineering 518; Mechanical Engineering 518.)
Recommended Background: Fluid mechanics, differential equations, and compressible flows.
Registration Permission: Consent of instructor.

BME  529  Applications of Linear Algebra in Engineering Systems (3)
SEC. 001  CRN  24641  (Video Recorded)
TIME: Tuesday & Friday 9:15 – 10:30  E-113
PROF: Dr. Monty Smith

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

Cross-listed: (Same as Chemical and Biomolecular Engineering 529; Civil Engineering 529, Electrical and Computer Engineering 529; Environmental Engineering 529; Industrial Engineering 529; Materials Science and Engineering 529; Mechanical Engineering 529; Nuclear Engineering 529).
Comment(s): Graduate standing or consent of instructor required.

*BME 578 Advanced Biomaterials; Biological Applications of Nanomaterials (3) CANCELLED
SEC. 002 CRN 30821 (Same as MSE 002 CRN 30822)
TEXT: TBD
TIME: Tuesday & Thursday 10:10 – 11:25  E-110
PROF: Dr. Michael L. Simpson

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

*BME 587 Dynamic Modeling and Simulation (3) CANCELLED
SEC. 002 CRN 29380 (Same as ME 587 002 CRN 29379)
TEXT: TBD
TIME: Tuesday & Thursday 2:40 – 3:55  E-110
PROF: Dr. Gary V. Smith

Cross-listed: (Same as Mechanical Engineering 587.)
Recommended Background: 363.

BME 590 Selected Biomedical Engineering Problems (2-6)
SEC. 001 CRN 28069 Johnson

Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 6 hours.
Comment(s): Enrollment is limited to students in the non-thesis option.
Credit Level Restriction: Graduate credit only.
Registration Restriction(s): Minimum student level – graduate.
Registration Permission: Consent of instructor.

BME 595 Biomedical Seminar (1)
SEC. 002 CRN 27109
TEXT: None
TIME: Will be announced through email
PROF: Dr. Jacqueline Johnson

All phases of biomedical engineering, reports on current research at UTK and UTSI.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 20 hours.
Credit Level Restriction: Graduate credit only.
Registration Restriction(s): Minimum student level – graduate

BME  599  Modern Radiation Therapy (3)
SEC.  005  CRN  27126
TIME:  Monday & Wednesday  2:40 – 3:55  E-114
PROF:  Dr. Jacqueline Johnson

Prerequisites are *The Physics of Radiation Therapy I: Classical Radiation Therapy.*
Three-dimensional Radiation Therapy, Intensity-Modulated Radiation Therapy, Stereotactic Radiosurgery, High-Dose-Rate Brachytherapy, Prostate Implants, Intravascular Brachytherapy, Image-Guided Radiation Therapy, Proton Beam Therapy.
Grades will be done on eRad test results (50%). Course will be done online live and without prior knowledge of which test. Homework based on class lectures will account for the other 50%.
Repeatability: May be repeated. Maximum 12 hours.
Registration Permission: Consent of instructor.

BME  599  Special Topics in BME: Introduction to Micro/Nano Manufacturing (3)
SEC.  007  CRN  30831  (Same as AE 599 015 30801; ME 599 015 CRN 30802)
TEXT:  Provided by instructor
TIME:  Tuesday & Thursday  2:40 – 3:55  E-110
PROF:  Dr. Anming Hu and Dr. Feng-Yuan Zhang

Fundamentals of micro-nano-manufacturing with an emphasis on the relationships between unique functions of micro-nano-materials, designed architectures, and appropriate manufacturing strategies will be discussed. This course will well blend the knowledge of nanotechnology, advanced manufacturing and additive manufacturing (3D printing). Students will conduct independent literature review research on micro-nano-manufacturing techniques they selected. The group project will be conducted in the Instructor labs.
This interactive course is designed for both undergraduate and graduate students.
Prerequisites and Co-requisites:
Basics of manufacturing sciences and mechanical engineering will be required. If in doubt, please ask instructor for approval. Number of seats will be limited to 15 for effective group projects at the Instructor’s lab.
Major: Open to all Engineering Majors [seniors and graduate students]
Repeatability: May be repeated. Maximum 6 hours.

BME  600  Doctoral Research/Dissertation (3-15)
SEC.  011  CRN  26939  Johnson

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

BME  601  Doctoral Research Methodology (3)
SEC.  002  CRN  30629
TEXT:  TBD
TIME:  TBD
PROF: Dr. Eric Boder

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

ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

ECE  600 Doctoral Research/Dissertation (3-15)
SEC.  031 CRN 30472 Bomar

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

ECE  529 Applications of Linear Algebra in Engineering Systems (3)
SEC.  001 CRN 30600 (Video Recorded)
TIME: Tuesday & Friday 9:15 – 10:30 E-113
PROF: Dr. Monty Smith

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

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

ENGINEERING MANAGEMENT

EM  500 Master’s Thesis (1-15)
SEC.  001 CRN 28887 Simonton
002 CRN 30473 Tolk
003 CRN 30474 Yu

Grading Restriction: P/NP only.
Repeatability: May be repeated.
Credit Level Restriction: Graduate credit only.
Registration Restriction(s): Minimum student level – graduate.
EM  501  Capstone Project (3-6)
SEC. 001  CRN  22287  Simonton
002  CRN  28888  Tolk
003  CRN  30475  Yu

Application-oriented project to show competence in major academic area.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 6 hours.
Comment(s): Requires enrollment in engineering management.
Credit Level Restriction: Graduate credit only.
Registration Restriction(s): Minimum student level – graduate.

EM  502  Registration for Use of Facilities (1-15)
SEC. 001  CRN  22288  Simonton

Required for the student not otherwise registered during any semester when student uses university
facilities and/or faculty time before degree is completed.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated.
Credit Restriction: May not be used toward degree requirements.
Credit Level Restriction: Graduate credit only.
Registration Restriction(s): Minimum student level – graduate.

EM  533  Theory and Practice of Engineering Management (3)
SEC. 001  CRN  22289  Students participating at Tullahoma classrooms
002  CRN  22290  Students participating by distance ed.
003  CRN  22291  Students participating at Knoxville DE classrooms

Productive Workplaces Revisited: Dignity, Meaning and Community in the 21st Century,
TIME: Wednesday 4:00 – 6:35 E-113
PROF: Dr. James L. Simonton

Principles of engineering management, including: business and organization design, culture, leadership,
marketing and competition in global economy, motivation and performance management, empowerment,
organizational behavior, and diversity. Systems thinking, learning organizations, and systems dynamics
modeling. Principle application to work settings and case studies.

EM  534  Financial Management for Engineering Managers (3)
SEC. 001  CRN  22293  Students participating at Tullahoma classrooms
002  CRN  22294  Students participating by distance ed.
003  CRN  22295  Students participating at Knoxville DE classrooms

TIME: Monday 3:00 – 5:30 E-113
PROF: Dr. Andrew Yu
Financial and managerial accounting in engineering and technology management. Transaction recording, financial statements, ratios and analysis, activity-based accounting, and standard practices for costing, budgeting, assessment, and control.

EM 538 New Venture Formation (3)
TIME: Thursday 4:00 – 6:35 E-113
PROF: Dr. James Simonton

Factors other than mechanical or chemical which enter into successful establishment of manufacturing or service enterprise. Organizational and financial planning and evaluation. Cost and location studies and market analysis to determine commercial feasibility of new ventures.

(RE) Prerequisite(s): 539.

EM 541 Managing Change and Improvement in Technical Organizations (3)
TIME: Tuesday 4:00 – 6:35 E-113
PROF: Dr. Janice Tolk


(RE) Prerequisite(s): Industrial Engineering 516

EM 600 Doctoral Research/Dissertation (3-15)
Grading Restriction: P/NP only.
Repeatability: May be repeated.
Registration Restriction(s): Minimum student level – graduate.

INDUSTRIAL ENGINEERING

IE 517 Reliability of Lean Systems
SEC. 001 CRN 27976 UTK students participating at Knoxville DE classrooms
002 CRN 27977 UTK students participating elsewhere
003 CRN 28015 UTSI students participating elsewhere
Course is divided into two major components. First half of the course will focus on introducing the students to the concepts of reliability and maintainability and the impact of lean on the reliability of complex systems. The concepts of reliability engineering are utilized to address lean system failures, including equipment failures, human failures, material failures and scheduling failures. Will develop the ability to design systems that are both lean and reliable. The second half of the course will introduce students to specific case studies of systems failures and ask student to develop solutions by considering different dimensions including financial, technical feasibility, risk, safety, security and others. Multi criteria decision making methodologies will be presented to allow students to make decisions when different criteria lead to conflicting solutions.

(RE) Prerequisite(s): 516.

Recommended Background: Background in lean and reliability.

IE  518  Advanced Engineering Economic Analysis (3)
SEC.  001  CRN 21966  UTK students participating at Knoxville DE classrooms
SEC.  002  CRN 21967  UTK students participating elsewhere
SEC.  003  CRN 21968  UTSI participating elsewhere

TIME:  Monday & Wednesday  2:10 – 3:35 (Eastern Time)  UTK

PROF:  Dr. R. Kress

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.

(RE) Prerequisite(s): 405.

Recommended Background: Statistics 251.

IE  522  Optimization Methods in Industrial Engineering (3)
SEC.  001  CRN 21970  UTK students participating at Knoxville DE classrooms
SEC.  002  CRN 21971  UTK students participating elsewhere
SEC.  003  CRN 21972  UTSI students participating elsewhere

TIME:  Tuesday & Thursday  11:10 – 12:25 (Eastern Time) UTK
TEXT:  TBD

PROF:  Dr. Mingzhou Jin

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

(RE) Prerequisite(s): Engineering Management 537.

Recommended Background: 301.

IE  529  Applications of Linear Algebra in Engineering Systems (3)
SEC.  001  CRN 21978  (Video Recorded)


TIME:  Tuesday & Friday  9:15 – 10:30  E-113
Fundamental concepts of linear algebra to problems in engineering systems: steady state and dynamic systems. Geometric and physical interpretations of relevant concepts: least square problems, LU, QR, and SVD decompositions of system matrix, eigenvalue problems, and similarity transformations in solving difference and differential equations; numerical stability aspects of various algorithms; application of linear algebra concepts in control and optimization studies; introduction to linear programming. Computer projects.


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

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

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

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

*MSE 578 Advanced Biomaterials; Biological Applications of Nanomaterials (3) CANCELLED
SEC. 002 CRN 30822 (Same as BME 002 CRN 30821)
TEXT: TBD
TIME: Tuesday & Thursday 10:10 – 11:25 E-110
PROF: Dr. Michael L. Simpson

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

Cross-listed: (Same as Material Science Engineering 578.)
Recommended Background: 474.
Comment(s): Prior knowledge may satisfy prerequisites, with consent of instructor.

MATHEMATICS

*MATH 435 Partial Differential Equations (3) CANCELLED
SEC. 002 CRN 20425
TIME: Tuesday 2:00 – 4:30 F-253
PROF: Dr. Jan Zijlstra

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

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

MATH 512 Methods in Applied Mathematics II (3)
SEC. 001 CRN 28934 (Video Recorded)
TIME: Monday & Thursday 1:00 – 2:15 E-113
PROF: Dr. Horace Crater

Fundamentals and techniques associated with continuous models of physical, engineering, and biological systems: development, solution and qualitative analysis of ordinary and partial differential equations, and calculus of variations. Also included will be studies of orthogonal polynomials, special functions, quaternions, mathematical topics in Hamiltonian mechanics, perturbation theory, and nonlinear dynamics.

(DE) Prerequisite(s): 511.
MATH 517 Mathematical Methods in Physics I (3)
SEC. 001 CRN 26536 (Same as Physics 571 001 CRN 26548
TIME: Monday & Thursday 12:30 – 1:45 E-111
PROF: Dr. Christian Parigger

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.

Cross-listed: (Same as Physics 517.)
Recommended Background: Advanced calculus and differential equations.
Comment: This course can be used for the Interdisciplinary Graduate Minor in Computational Science (see http://igmcs.utk.edu)

MECHANICAL ENGINEERING

ME 500 Master’s Thesis (1-15)
SEC. 001 CRN 21848 Abedi
021 CRN 21868 Antar
022 CRN 21869 Anusonti-Inthra
023 CRN 21870 Majdalani
024 CRN 21871 Moeller
025 CRN 21872 Solies
026 CRN 21873 Vakili
034 CRN 26549 Zhang
035 CRN 28868 Schmisseur

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

ME 502 Registration for Use of Facilities (1-15)
SEC. 002 CRN 26021 Moeller

Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated.
Credit Restriction: May not be used toward degree requirements.
Credit Level Restriction: Graduate credit only.
Registration Restriction(s): Minimum student level – graduate.
ME  512  Heat Transfer II (3)
SEC.  001  CRN  21884
TEXT:  Adrian Bejan; Convection Heat Transfer; 4th Edition; John Wiley
TIME:  Monday & Wednesday  4:30 – 5:45  F-253
PROF:  Dr. Feng Yuan Zhang

Analysis of steady-state and time-dependent heat conduction by numerical methods. Analysis of laminar and turbulent convection heat transfer in internal and external flows, forced and buoyancy driven flows. 
(ED) Prerequisite(s): 541.

ME  517  Finite Elements for Engineering Applications (3)
SEC.  001  CRN  28886  (Same as AE 517 001 CRN 28919)
ISBN: 9780979004902
TIME:  Monday & Wednesday  8:40 – 9:55  E-110
PROF:  Dr. Reza Abedi

Modern computational theory applied to conservation principles across the engineering sciences. Weak forms, extremization, boundary conditions, discrete implementation via finite element, finite difference, finite volume methods. Asymptotic error estimates, accuracy, convergence, stability. Linear problem applications in 1, 2 and 3 dimensions, extensions to non-linearity, non-smooth data, unsteady, spectral analysis techniques, coupled equation systems. Computer projects in heat transfer, structural mechanics, mechanical vibrations, fluid mechanics, heat/mass transport.
Cross-listed: (Same as Aerospace Engineering 517)
Comment(s): Bachelor’s degree in engineering or natural science required.
Registration Permission: Consent of instructor.

*ME  518  Computational Fluid Dynamics (3)  CANCELLED
SEC.  002  CRN  30819  (Same as AE 518 002 CRN 30818; BME 002 CRN 30820)
TEXT:  TBD
TIME:  Tuesday & Thursday  8:40 – 9:55  E-110
PROF:  Dr. Eivanc Ekici

Cross-listed: (Same as Aerospace Engineering 518; Biomedical Engineering 518.)
Recommended Background: Fluid mechanics, differential equations, and compressible flows.
Registration Permission: Consent of instructor.

ME  522  Thermodynamics II (3)
SEC.  001  CRN  21886
TEXT:  TBD
Macroscopic thermodynamics, including First and Second Law analyses, availability, phase and chemical equilibrium criteria, combustion, gas mixtures, and property relations, determination of thermodynamic properties from molecular structure, spectroscopic data, kinetic theory, statistical mechanics, quantum physics, Schroedinger equation.

Recommended Background: Undergraduate thermodynamics.

ME 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 001 CRN 21888 (Video Recorded)
TIME: Tuesday & Friday 9:15 – 10:30 E-113
PROF: Dr. Monty Smith

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


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

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

ME 534 Mechanical Vibrations (3)
SEC. 003 CRN 29386 (Same as AE 535 003 CRN 29385)
TEXT: TBD
TIME: Monday & Wednesday 10:10 – 11:25 E-110
PROF: Dr. Stephanie TerMaath


Cross-listed: (Same as Aerospace Engineering 535)

Recommended Background: An undergraduate vibrations course.

ME 542 Fluid Mechanics II (3)
SEC. 001 CRN 21891 (Same as AE 542 001 CRN 24528)
TIME: Thursday 7:30 – 10:00 E-210
PROF: Dr. Steve Brooks

*Cross-listed: (Same as Aerospace Engineering 542.)*  
*(DE) Prerequisite(s): 541.*

**ME 570 Numerical Methods for Engineers (3)**  
**SEC. 001 CRN 30848**  
**TEXT: TBD**  
**TIME: Monday & Wednesday 11:30 – 12:45 F-253**  
**PROF: Dr. Phuriwat Anusonti-Inthra**

Review and implementation of basic numerical techniques. Explicit and implicit solution techniques of ordinary differential equations and partial differential equations. Applications include heat transfer and fluid mechanics.  

*Recommended Background: Numerical analysis, fluid mechanics, heat transfer and differential equations.*  
*Registration Permission: Consent of Instructor.*

**ME 585 Turbomachinery Systems II (3)**  
**SEC. 001 CRN 21893 (Video Recorded)**  
**TEXT: Jack D. Mattingly; Elements of Propulsion: Gas Turbines and Rockets; 2006; ISBN 1-56347-779-3**  
**TIME: Tuesday & Thursday 4:00 – 5:15 E-111**  
**PROF: Dr. Milt Davis**

Ideal cycle analysis of turbine engines, real cycle analysis, component performance analysis, component design and systems integration (inlets, nozzles, combustors, compressors, turbines), flowthrough theory, turbine engine component matching, transient operation, surge and rotating stall, engine control systems, structural considerations.  

*Comment(s): First-year graduate standing required.*  
*Registration Permission: Consent of instructor.*

**ME 587 Dynamic Modeling and Simulation (3) CANCELLED**  
**SEC. 002 CRN 29379 (Same as BME 587 002 CRN 29380)**  
**TEXT: TBD**  
**TIME: Tuesday & Thursday 2:40 – 3:55 E-110**  
**PROF: Dr. Gary V. Smith**


*Cross-listed: (Same as Biomedical Engineering 587.)*  
*Recommended Background: 363.*

**ME 590 Selected Engineering Problems (2-6)**  
**SEC. 002 CRN 21894 Abedi**  
**003 CRN 26537 Antar**  
**005 CRN 26538 Anusonti-Inthra**  
**006 CRN 26539 Majdalani**  
**007 CRN 26540 Moeller**  
**008 CRN 26541 Solies**
ME  595 Mechanical Engineering Seminar (1)
SEC.  001 CRN 21895
TEXT: None
TIME: Will be announced through email
PROF: Dr. Ahmad Vakili

All phases of mechanical engineering, reports on current research at the University of Tennessee, Knoxville, and the University of Tennessee Space Institute.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 20 hours.

ME  599 Special Topics in ME: Atmospheric Sciences for AE and ME (3)
SEC.  002 CRN 27956 (Same as AE 599 001 CRN 24534)
TIME: Monday & Wednesday 10:10 – 11:25 E-114
PROF: Dr. Steve Brooks

Structure of the atmosphere, energy balance, turbulent boundary layer, solar forcing, satellite drag, aero-maneuvers and de-orbits, and hypersonic flight in the upper atmosphere. These will be extended to the Venusian, Martian and Jovian atmospheres.
Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor

*ME  599 Special Topics in ME: Intro to Fluid Structure Interactions (3) CANCELLED
SEC.  005 CRN 28025 (Same as AE 599 003 CRN 27955)
TEXT: Recommended material: ANSYS Fluid-Structure Interaction Simulation Guides
TIME: Tuesday & Thursday 1:10 – 2:25 E-110
PROF: Dr. Phuriwat Anusonti-Inthra

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

ME  599 Special Topics in ME: Introduction to Micro/Nano Manufacturing (3)
SEC.  015 CRN 30802 (Same as BME 599 007 CRN 30831; AE 599 015 CRN 30801)
TEXT: Provided by instructor
TIME: Tuesday & Thursday 2:40 – 3:55 E-110
PROF: Dr. Anming Hu and Dr. Feng-Yuan Zhang
Fundamentals of micro-nano-manufacturing with an emphasis on the relationships between unique functions of micro-nano-materials, designed architectures, and appropriate manufacturing strategies will be discussed. This course will well blend the knowledge of nanotechnology, advanced manufacturing and additive manufacturing (3D printing). Students will conduct independent literature review research on micro-nano-manufacturing techniques they selected. The group project will be conducted in the Instructor labs.

This interactive course is designed for both undergraduate and graduate students.

Prerequisites and Co-requisites:
Basics of manufacturing sciences and mechanical engineering will be required. If in doubt, please ask instructor for approval. Number of seats will be limited to 15 for effective group projects at the Instructor’s lab.

Major: Open to all Engineering Majors [seniors and graduate students]

Repeatability: May be repeated. Maximum 6 hours.

ME  600  Doctoral Research/Dissertation (3-15)
SEC.  015  CRN 21913  Abedi
        016  CRN 21914  Antar
        018  CRN 21916  Anusonti-Inthra
        019  CRN 21917  Flandro
        027  CRN 21925  Majdalani
        028  CRN 21926  Moeller
        029  CRN 26545  Solies
        030  CRN 26546  Vakili
        031  CRN 28869  Zhang
        032  CRN 28938  Schmisseur

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

ME  601  Doctoral Research Methodology (3)
SEC.  002  CRN 30630
TEXT:  TBD
TIME:  TBD
PROF:  Dr. Kivanc Ekici

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

PHYSICS

PHYS  500  Master’s Thesis (1-15)
SEC.  002  CRN 23994  Davis
        003  CRN 23995  Lewis
        004  CRN 23996  Parigger

Grading Restriction: P/NP only.
Repeatability: May be repeated.
Credit Level Restriction: Graduate credit only.

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

**PHYS 503 Physics Colloquium (1)**
- **SEC.: 002 CRN: 24002**
- **TEXT: None**
- **TIME: 2nd & 4th Thursday 3:30 – 5:00 H-111**
- **PROF: Dr. Lloyd Davis**

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

**Grading Restriction: Satisfactory/No Credit grading only.**

**Repeatability:** May be repeated. Maximum 6 hours.

**PHYS 541 Electromagnetic Theory (3)**
- **SEC.: 002 CRN: 25561**
- **TEXT: TBD**
- **TIME: Monday and Thursday 10:45 – 12:00 E-113**
- **PROF: Dr. Horace Crater**

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.

**Prerequisite(s):** 571.

**PHYS 571 Mathematical Methods in Physics I (3)**
- **SEC.: 001 CRN: 26548** (Same as Math 517 001 CRN 26536)
  Mathematical Methods in the Physical Sciences; Wiley 2005; 3rd Edition; ISBN 13: 978-0471198260; Boas. These two books will serve as the primary text for this course. Other books will be used as well, e.g., Mathematical Physics with Partial Differential Equations by J.R. Kirkwood (Elsevier, 2013)
- **TIME: Monday & Thursday 12:30 – 1:45 E-111**
- **PROF: Dr. Christian Parigger**

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.

**Cross-listed:** (Same as Mathematics 517.)

**Recommended Background:** Advanced calculus and differential equations.

**Comment:** This course can be used for the Interdisciplinary Graduate Minor in Computational Science (see [http://igmcs.utk.edu](http://igmcs.utk.edu))

**PHYS 599 Seminars (1)**
- **SEC.: 007 CRN: 24020**
- **TEXT: None**
- **TIME: 2nd & 4th Thursday 3:30 – 5:00 H-111**
- **PROF: Dr. Lloyd Davis**
(a) Mechanics; (b) Radiation; (c) Heat and Thermodynamics; (d) Electricity and Magnetism; (e) Modern Physics.

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

PHYS 599 Seminars (1)
SEC. 010 CRN 30619
TEXT: None
TIME: 2nd & 4th Thursday 3:30 – 5:00 H-111
PROF: Dr. Christian Parigger

(a) Mechanics; (b) Radiation; (c) Heat and Thermodynamics; (d) Electricity and Magnetism; (e) Modern Physics.

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

PHYS 600 Doctoral Research/Dissertation (3-15)
SEC. 002 CRN 24023 Davis
SEC. 003 CRN 24024 Parigger

Grading Restriction: P/NP only.

Repeatability: May be repeated.

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

PHYS 606 Nonlinear Optics
SEC. 001 CRN 26957
TIME: Monday and Thursday 8:15 – 9:30 CLA Conf. Room
PROF: 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.

(DE) Prerequisite(s): 522.

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