THE UNIVERSITY OF TENNESSEE SPACE INSTITUTE

SUMMER 2015 REGISTRATION ANNOUNCEMENT

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CALENDAR - SUMMER SEMESTER 2015

Priority Registration.....February 25 – May 28, 2015
Admission to Candidacy Forms for Summer 2015 Commencement.....April 24, 2015
Summer 2014 Graduation Application Deadline submit online at MyUTK .....April 24, 2015
Graduation Fee Payment Deadline (MS $30, PhD $75).....April 24, 2015
Late Registration and late fees..... May 30, 2015
Classes begin.....June 1, 2015
Last Day to Late Register, Add, Change Grading Options or Drop Without a "W".....June 9, 2015
Preliminary Thesis/Dissertation Review Deadline .....June 19, 2015
Independence Day Holiday.....July 3, 2015
Last day to schedule final exam non-thesis .....July 10, 2015
Last day to schedule final exam thesis.....July 10, 2015
Last day to schedule final exam dissertation .....July 10, 2015
Last day to take final exam (non-thesis/thesis/dissertation students) .....July 17, 2015
Drop with a "W".....July 21, 2015
Electronic Thesis/Dissertation to TRACE (5:00 P.M. EST) .....July 31, 2015
Submit report of final examination (Pass/Fail) form .....July 31, 2015
Deadline for Submission of Admission to Candidacy for students
Graduating Fall 2015 and Graduation Application.....August 6, 2015
Deadline for removing "INCOMPLETE" grades .....August 6, 2015
Classes End.....August 6, 2015
Exam Period (Exams are given during the regularly scheduled class meeting times.)
Total Withdraw from the University Deadline .....August 6, 2015
No Commencement Ceremony or Graduate Hooding – Graduation Date..... August 14, 2015
Second thesis/dissertation deadlines
Defense Completed by August 6, 2015
Second Deadline Application Submitted by August 6, 2015
http://gradschool.utk.edu/forms/Second%20Deadline%20Graduation%20Application.pdf
and submit a new graduation application for Fall graduation
Thesis/Dissertation Submission Deadline by August 18, 2015
(Student will receive diploma fall 2015 semester, but will not be required to register for thesis/dissertation credits)

FALL SEMESTER 2015

Priority Registration..... March 9 – August 17, 2015
Late Registration .....August 19, 2015
Classes Begin.....August 19, 2015
Labor Day Holiday ..... September 7, 2015
Fall Break..... October 15 -16, 2015
Thanksgiving Break..... November 26 – 27, 2015
Classes End.....December 1, 2015
Study Period.....December 2, 2015
Exam Period.....December 3, 4 & 7, 2015
Graduate Hooding Ceremony (UTK) .....December 10, 2015
Commencement (UTK) .....December 11, 2015
Official Graduation Date.....December 11, 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

SUMMER SEMESTER 2015

EXAM SCHEDULE

LAST DAY OF CLASSES ..... August 6, 2015

FINAL EXAMS FOR SUMMER ARE GIVEN DURING THE REGULARLY SCHEDULED CLASS MEETING TIMES.

****** ATTENTION ******

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

REGISTRATION ANNOUNCEMENT
SUMMER SEMESTER 2015

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 **August 6, 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

Final exams for summer semester are given during the regularly scheduled class meeting time.

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
Summer 2015 Course Listings

AEROSPACE ENGINEERING

AE	500	Thesis (1-15)	
	002	CRN 81833	Abedi
	003	CRN 81834	Antar
	004	CRN 81835	Anusonti-Inthra
	005	CRN 81836	Majdalani
	009	CRN 81840	Moeller
	010	CRN 81841	Schmisseur
	011	CRN 81842	Solies
	013	CRN 81844	Vakili
	014	CRN 81845	Zhang

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

AE	502	Registration for Use of Facilities (1-15)	
SEC.	003	CRN 81848	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 532 Introduction to Turbulence (3)
SEC. 001 CRN 84391
TEXT: *Turbulent Flows*; S.B. Pope; Cambridge University Press, Paperback – 771 pages; ISBN 0521598869
TIME: Tuesday & Thursday 10:00 – 12:30 E-113
PROF: Dr. John Schmisseur

Macroscopic effects, analogies, statistical treatment, correlation functions, energy spectra, diffusion; application of turbulent jets and pipe flow.

Introduction to Turbulence will provide a solid foundation in the fundamentals of the theory of turbulent flows and their application within the analysis of flows of current engineering interest.

Course Goals:

- Familiarize students with the broad spectrum of current methods used to study turbulent flows
- Enable students to make discriminating choices with regard to the application of current methods

(DE) Prerequisite(s): 511 and 512.

AE	590	Selected Engineering Problems (2-6)		
SEC.	001	CRN	81849	Abedi
	002	CRN	81850	Antar
	003	CRN	81851	Anusonti-Inthra
	004	CRN	82139	Majdalani
	005	CRN	82140	Moeller
	006	CRN	82141	Schmisseur
	007	CRN	82142	Solies
	008	CRN	82143	Vakili
	009	CRN	82144	Zhang

Repeatability: May be repeated. Maximum 6 hours.
Comment(s): Enrollment limited to students in problems option.
Registration Permission: Consent of advisor.

AE 599 Special Topics in AE: Introduction to Non-Intrusive Diagnostics Gas Diagnostics (3)
SEC. 003 CRN 82871
TEXT: J. Michael Hollas, **Modern Spectroscopy**, 4th ed., Wiley, 2004
G.S. Settles, **Schlieren and Shadowgraph Techniques**, Springer, 1949 (2001 printing) available in the university library. Various other sources provided by instructor
TIME: TBD
PROF: Dr. Trevor Moeller

This is an instructor guided independent-study course that will introduce the engineering student to the wide range of non-intrusive diagnostic techniques available for the characterization of gases. Techniques covered include spectroscopy (atomic, molecular, and Raman), laser diagnostics (PIV, LIF, PLIF, and LIBS), and shadowgraph and schlieren techniques. Each technique will be covered at a level to allow the student to have the knowledge to assess applicability of non-intrusive diagnostics techniques to various applications.

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

AE	600	Doctoral Research and Dissertation (3-15)		
SEC.	002	CRN	81853	Abedi
	003	CRN	81854	Antar
	004	CRN	81855	Anusonti-Inthra
	005	CRN	81856	Flandro
	011	CRN	81862	Majdalani
	012	CRN	81863	Moeller
	013	CRN	82490	Schmisseur
	014	CRN	83145	Solies
	015	CRN	83146	Vakili
	016	CRN	83147	Zhang

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

AVIATION SYSTEMS

AVSY	500	Thesis (1-15)	
SEC.	001	CRN 81569	Brooks
	002	CRN 81570	Martos
	003	CRN 81571	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 81589	Brooks
	002	CRN 81590	Martos
	003	CRN 81591	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	550	Project in Aviation Systems (3)	
SEC.	001	CRN 81593	Brooks
	002	CRN 81594	Martos
	003	CRN 81595	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	Thesis (1-15)	
SEC.	010	CRN 82888	Johnson

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

BME 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 001 CRN 81879 (Video Recorded)
TEXT: *Advanced Linear Algebra for Engineers with MATLAB*; Sohail A. Dianat and Eli S. Saber; CRC Press; Latest Edition; ISBN 978-1-4200-9523-4
TIME: Monday, Wednesday & Friday 10:00 – 11:15 E-113
PROF: Dr. Monty Smith

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

Methods of linear algebra with application to engineering problems. Systems of linear equations: matrix-vector notation, solutions to linear equations, determinants, matrix inversion. Vector spaces: spanning sets, orthogonality, matrix decompositions, linear transformations. Eigenvalues and eigenvectors: characteristic polynomials, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices. Optimization: least-squares and weighted least-squares methods.

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

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

BME 600 Doctoral Research and Dissertation (3-15)
SEC. 009 CRN 82889 Johnson

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

CHEMICAL AND BIOMOLECULAR

CBE 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 001 CRN 81900 (Video Recorded)
TEXT: *Advanced Linear Algebra for Engineers with MATLAB*; Sohail A. Dianat and Eli S. Saber; CRC Press; Latest Edition; ISBN 978-1-4200-9523-4
TIME: Monday, Wednesday & Friday 10:00 – 11:15 E-113
PROF: Dr. Monty Smith

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

linear algebra concepts in control and optimization studies; introduction to linear programming. Computer projects.

Methods of linear algebra with application to engineering problems. Systems of linear equations: matrix-vector notation, solutions to linear equations, determinants, matrix inversion. Vector spaces: spanning sets, orthogonality, matrix decompositions, linear transformations. Eigenvalues and eigenvectors: characteristic polynomials, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices. Optimization: least-squares and weighted least-squares methods.

Cross-listed: (Same as Biomedical Engineering 529; 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.

CIVIL ENGINEERING

CE 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 001 CRN 83549 (Video Recorded)
TEXT: *Advanced Linear Algebra for Engineers with MATLAB*; Sohail A. Dianat and Eli S. Saber; CRC Press; Latest Edition; ISBN 978-1-4200-9523-4
TIME: Monday, Wednesday & Friday 10:00 – 11:15 E-113
PROF: Dr. Monty Smith

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

Methods of linear algebra with application to engineering problems. Systems of linear equations: matrix-vector notation, solutions to linear equations, determinants, matrix inversion. Vector spaces: spanning sets, orthogonality, matrix decompositions, linear transformations. Eigenvalues and eigenvectors: characteristic polynomials, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices. Optimization: least-squares and weighted least-squares methods.

Cross-listed: (Same as Chemical and Biomolecular Engineering 529; Biomedical 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.

ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

ECE 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 001 CRN 82078 (Video Recorded)
TEXT: *Advanced Linear Algebra for Engineers with MATLAB*; Sohail A. Dianat and Eli S. Saber; CRC Press; Latest Edition; ISBN 978-1-4200-9523-4
TIME: Monday, Wednesday & Friday 10:00 – 11:15 E-113
PROF: Dr. Monty Smith

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

Methods of linear algebra with application to engineering problems. Systems of linear equations: matrix-vector notation, solutions to linear equations, determinants, matrix inversion. Vector spaces: spanning sets, orthogonality, matrix decompositions, linear transformations. Eigenvalues and eigenvectors: characteristic polynomials, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices. Optimization: least-squares and weighted least-squares methods.

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

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

ECE 600 Doctoral Research and Dissertation (3-15)
SEC. 028 CRN 82108 Bomar

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

ENGINEERING MANAGEMENT

EM 500 Thesis (1-15)
SEC. 001 CRN 83384 Simonton
002 CRN 84242 Tolk
003 CRN 84243 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 80003 Simonton
002 CRN 84244 Tolk
003 CRN 84245 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 80004 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 536 Project Management (3) (Video Recorded)
SEC. 001 CRN 80005 Students participating at Tullahoma classrooms
002 CRN 80006 Students participating by distance ed.
003 CRN 80007 Students participating at Knoxville DE classrooms
TEXT: *Project Management: A Managerial Approach*; Jack R. Meredith, Samuel J. Mantel, Jr.; John Wiley & Sons, Inc.; 8th Edition; ISBN 978-0-470-53302-4
TIME: Tuesday & Thursday 4:00 - 6:35 E-113
PROF: Dr. James Simonton

Development and management of engineering and technology projects. Project proposal preparation; resource and cost estimating; and project planning, organizing, and controlling: network diagrams and other techniques. Role of project manager: team building, conflict resolution, and contract negotiations. Discussion of typical problems and alternative solutions. Case studies and student projects.
(RE) Prerequisite(s): 537 or consent of instructor.

EM 595 Special Topics in Engineering Management (3)
SEC. 001 CRN 82866
TEXT: TBD
TIME: TBD
PROF: Dr. James Simonton

Problems and topics relevant to current issues in the field.
Repeatability: May be repeated if topic differs. Maximum 6 hours.

EM 543 Legal and Ethical Aspects of Engineering Management (3) (Video Recorded)
SEC. 001 CRN 84318
TEXT: *Business Ethics: Ethical Decision Making & Cases;* O. C. Ferrell, John Fraedrich, Linda Ferrell; Publisher: Cengage Learning; Edition: 10th, 2014,paperback; ISBN-13: 978-1285423715 ISBN-10: 1285423712
TIME: Record Only
PROF: Dr. Clovia Hamilton

Legal aspects imposed by government and ethical considerations in engineering practice. Selected readings, lecture, discussion, and student presentations. Current topics from government and industry.

EM 600 Doctoral Research and Dissertation (3-15)
SEC. 002 CRN 82389 Simonton
004 CRN 84289 Tolk

005 CRN 84299 Yu

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

ENVIROMENTAL ENGINEERING

ENVE 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 001 CRN 83550 (Video Recorded)
TEXT: *Advanced Linear Algebra for Engineers with MATLAB*; Sohail A. Dianat and Eli S. Saber; CRC Press; Latest Edition; ISBN 978-1-4200-9523-4
TIME: Monday, Wednesday & Friday 10:00 – 11:15 E-113
PROF: Dr. Monty Smith

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

Methods of linear algebra with application to engineering problems. Systems of linear equations: matrix-vector notation, solutions to linear equations, determinants, matrix inversion. Vector spaces: spanning sets, orthogonality, matrix decompositions, linear transformations. Eigenvalues and eigenvectors: characteristic polynomials, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices. Optimization: least-squares and weighted least-squares methods.

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

INDUSTRIAL ENGINEERING

IE 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 001 CRN 80106 (Video Recorded)
TEXT: *Advanced Linear Algebra for Engineers with MATLAB*; Sohail A. Dianat and Eli S. Saber; CRC Press; Latest Edition; ISBN 978-1-4200-9523-4
TIME: Monday, Wednesday & Friday 10:00 – 11:15 E-113
PROF: Dr. Monty Smith

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

Methods of linear algebra with application to engineering problems. Systems of linear equations: matrix-vector notation, solutions to linear equations, determinants, matrix inversion. Vector spaces: spanning sets, orthogonality, matrix decompositions, linear transformations. Eigenvalues and eigenvectors: characteristic polynomials, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices. Optimization: least-squares and weighted least-squares methods.

Cross-listed: (Same as Chemical and Biomolecular Engineering 529; Biomedical 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.

IE 603 Design and Analysis of Industrial Experiments (3)
SEC. 001 CRN 84395 (Video Recorded)
TEXT: *Principles of Experimental Design and Analysis*; Alberto Garcia-Diaz and D. T. Phillips; Chapman & Hall, New York, 1995; Recommended Books
Statistics for Experimenters, Box, G.E.P., Hunter, J.S. and Hunter, W.G.; John Wiley & Sons.
The Design and Analysis of Industrial Experiments, edited by O.L. Davies; Hafner Publishing Company.
An Introduction to Linear Statistical Models, Graybill, F.A., McGraw-Hill, 1961.
TIME: Tuesday & Thursday 1:00 – 3:30 E-111
PROF: Dr. Alberto Garcia

Fundamental theory, concepts and procedures required in the efficient design and analysis of industrial experiments. Specific topics discussed include: review of fundamental principles of the design of experiments and ANOVA methodology, introduction to linear statistical models, experimental design models, cross classification models, two-way classification models, mixed models, specialized designs allowing multiple restrictions on randomization with or without replication, orthogonal arrays, symmetric and mixed full and fractional factorial experiments, response surface methodology, and Taguchi methods.
(DE) Prerequisite(s): 516.
Registration Restriction(s): Minimum student level – graduate.

MATERIALS SCIENCE AND ENGINEERING

MSE 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 001 CRN 80155 (Video Recorded)
TEXT: *Advanced Linear Algebra for Engineers with MATLAB*; Sohail A. Dianat and Eli S. Saber; CRC Press; Latest Edition; ISBN 978-1-4200-9523-4
TIME: Monday, Wednesday & Friday 10:00 – 11:15 E-113
PROF: Dr. Monty Smith

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

Methods of linear algebra with application to engineering problems. Systems of linear equations: matrix-vector notation, solutions to linear equations, determinants, matrix inversion. Vector spaces: spanning sets, orthogonality, matrix decompositions, linear transformations. Eigenvalues and eigenvectors:

characteristic polynomials, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices. Optimization: least-squares and weighted least-squares methods.

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

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

MATHEMATICS

Math 443 Complex Variables (3)
SEC. 001 CRN 81141 (Video Recorded)
TEXT: *Complex Variables*; Spiegel; Schaum's Outline McGraw Hill
TIME: Monday & Thursday 1:00 – 3:00 E-113
PROF: Dr. Horace Crater

Introduction to the theory of functions of a complex variable, including residue theory and contour integrals.
Theory of functions of complex variable (arithmetic, algebra, and trigonometry); complex differentiation and analytic functions with applications to solutions of Laplaces equations; complex integration, residue theory and contour integrals with applications to Fourier and Laplace transforms, Fourier Series, and the summation of infinite series; conformal mapping and applications to solving boundary value problems in physics and engineering including applications to fluid and heat flows and electrostatics.
(RE) Prerequisite(s): 241 or 247.

Math 578 Numerical Methods for Partial Differential Equations (3)
SEC. 001 CRN 83635
TEXT: (1) *Numerical Mathematics*; A. Quarteroni, R. Sacco, F. Saleri; Springer; 2nd Edition; ISBN-10:3540346589 ISBN-13:978-3540346586 (2) *A First Course in Computational Physics*; P.L. DeVries, J.E. Hasbun; and selected lecture notes including Matlab introductory notes; Jones and Bartlett; 2nd Edition; ISBN 978-0-7637-7314-4
TIME: Monday & Wednesday 1:00 – 2:45 E-111
PROF: Dr. Christian Parigger

Numerical approximation of solutions of partial differential equations including conservation laws and hyperbolic, parabolic, and elliptic problems. Derivation, physical meaning, and implementation of schemes.

Recommended Background: A course in partial differential equations or 512 or 515, and familiarity with an operating system and a programming language.

MECHANICAL ENGINEERING

ME 500 Thesis (1-15)
SEC. 002 CRN 80186 Abedi
004 CRN 80187 Antar
023 CRN 80212 Anusonti-Inthra
024 CRN 80213 Majdalani
027 CRN 80216 Moeller
028 CRN 80217 Schmisseur

029 CRN 82201 Solies
030 CRN 82202 Vakili
031 CRN 83149 Zhang

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

ME 502 Registration for Use of Facilities (1-15)
SEC. 002 CRN 80219 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 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 001 CRN 80221 (Video Recorded)
TEXT: *Advanced Linear Algebra for Engineers with MATLAB*; Sohail A. Dianat and Eli S. Saber; CRC Press; Latest Edition; ISBN 978-1-4200-9523-4
TIME: Monday, Wednesday & Friday 10:00 – 11:15 E-113
PROF: Dr. Monty Smith

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

Methods of linear algebra with application to engineering problems. Systems of linear equations: matrix-vector notation, solutions to linear equations, determinants, matrix inversion. Vector spaces: spanning sets, orthogonality, matrix decompositions, linear transformations. Eigenvalues and eigenvectors: characteristic polynomials, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices. Optimization: least-squares and weighted least-squares methods.

Cross-listed: (Same as Chemical and Biomolecular Engineering 529; Biomedical 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 590 Selected Engineering Problems (2-6)
SEC. 001 CRN 80235 Abedi
002 CRN 80236 Antar

003	CRN	80237	Anusonti-Inthra
004	CRN	82342	Majdalani
005	CRN	82343	Moeller
006	CRN	82344	Schmisseur
007	CRN	82345	Solies
008	CRN	82346	Vakili
009	CRN	82347	Zhang

Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 6 hours.
Comment(s): Enrollment limited to students in the problems option.
Registration Permission: Consent of advisor.

ME 600 Doctoral Research and Dissertation (3-15)

SEC. 002	CRN	80246	Abedi
003	CRN	80247	Antar
004	CRN	80248	Anusonti-Inthra
005	CRN	80249	Majdalani
020	CRN	80264	Moeller
025	CRN	80270	Schmisseur
026	CRN	82842	Solies
028	CRN	83151	Vakili
029	CRN	83152	Zhang

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

NUCLEAR ENGINEERING

NE 529 Applications of Linear Algebra in Engineering Systems (3)
SEC. 001 CRN 83551 (Video Recorded)
TEXT: *Advanced Linear Algebra for Engineers with MATLAB*; Sohail A. Dianat and Eli S. Saber; CRC Press; Latest Edition; ISBN 978-1-4200-9523-4
TIME: Monday, Wednesday & Friday 10:00 – 11:15 E-113
PROF: Dr. Monty Smith

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

Methods of linear algebra with application to engineering problems. Systems of linear equations: matrix-vector notation, solutions to linear equations, determinants, matrix inversion. Vector spaces: spanning sets, orthogonality, matrix decompositions, linear transformations. Eigenvalues and eigenvectors: characteristic polynomials, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices. Optimization: least-squares and weighted least-squares methods.

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

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

PHYSICS

PHYS	500	Thesis (1-15)	
SEC.	003	CRN 81315	Davis
	004	CRN 81316	Lewis
	005	CRN 81317	Parigger

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

PHYS	502	Registration for Use of Facilities (1-15)	
SEC.	002	CRN 82458	Davis

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.

PHYS	600	Doctoral Research and Dissertation (3-15)	
SEC.	001	CRN 81325	Davis
	003	CRN 81327	Parigger

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