

# Spring 2022 Registration Announcement



The University of Tennessee  
Space Institute  
411 B. H. Goethert Parkway  
Tullahoma, TN 37388-9700  
888-822-8874 ext. 37228  
[www.utsi.edu](http://www.utsi.edu)

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**DATES ARE SUBJECT TO CHANGE**  
<https://registrar.utk.edu/calendar/>

**CALENDAR - 2022 SPRING SEMESTER**

Priority Registration.....	November 1, 2021
Admission to Candidacy Forms for Spring 2022 Commencement .....	January 14, 2022
Spring 2020 Graduation Application Deadline (submit online) .....	January 14, 2022
Graduation Fee Payment Deadline (MS \$30, PhD \$75).....	January 14, 2022
Priority registration payment deadline 4:30 p.m. EST.....	January 20, 2022
Late Registration and late fee (\$100 Late Fee).....	January 24 - February 6, 2022
Classes begin.....	January 24, 2022
Last Day to final register, add, change grading options or drop without a “W”.....	January 31, 2022
Late registration payment deadline 4:30 p.m. EST.....	February 4, 2022
Martin Luther King Holiday .....	January 17, 2022
Late Registration and late fee begin (\$200 Late Fee) .....	February 7 - Forward
Preliminary Thesis/Dissertation Review Deadline .....	February 25, 2022
Spring Break (No Classes).....	March 14 – 18, 2022
Last day to schedule final exam (thesis/dissertation).....	April 1, 2022
Drop with a “W” .....	April 18, 2022
Last day to Defend (thesis/dissertation).....	April 7, 2022
No Class Day .....	April 14, 2022
Spring Recess (No Classes) .....	April 15, 2022
Thesis/Dissertation Deadline 5:00 p.m. EST (submitted and approved).....	April 22, 2022
Thesis/Dissertation Approval Form.....	April 22, 2022
Dissertation Survey of Earned Doctorates Certificate .....	April 22, 2022
Submit Pass/Fail form (thesis/dissertation).....	April 22, 2022
Submit Pass/Fail form (non-thesis).....	April 22, 2022
All "INCOMPLETE" must be removed for Graduation.....	May 6, 2022
Deadline for Submission of Admission to Candidacy for students Graduating Summer 2022 and Graduation Application.....	May 13, 2022
Classes End.....	May 10, 2022
Total Withdraw from the University Deadline .....	May 10, 2022
Study Period.....	May 11, 2022
Exam Period.....	May 12, 13, & 16, 2022
Graduate Hooding Ceremony (UTK) .....	TBD
COMMENCEMENT (UTK) .....	TBD
Official Graduation Date.....	May 21, 2022

Second thesis/dissertation deadline

    Last Day to Schedule Defense May 6, 2022

    Defense Completed by May 12, 2022

    Second Deadline Application Submitted by May 12, 2022

<https://gradschool.utk.edu/forms-central/second-deadline-graduation-application/>

    Thesis/Dissertation Submitted and Accepted by 5:00 p.m. EST June 8, 2022

    (Student will receive diploma summer 2022 semester, but will not be required to register for thesis/dissertation credits)

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**SUMMER SEMESTER 2022**

Priority Registration.....	TBD
Final Registration .....	TBD
Memorial Day Holiday .....	May 30, 2022

Classes begin..... June 9, 2022  
 Independence Holiday ..... July 4, 2022  
 Classes End..... August 9, 2022  
 Summer Graduation Date on Transcript (No Ceremony)..... August 13, 2022

**Dates may be revised without notice. Please refer to the following sites for updates:**

<https://gradschool.utk.edu/graduation/>  
[http://registrar.tennessee.edu/academic\\_calendar/index.shtml](http://registrar.tennessee.edu/academic_calendar/index.shtml)

**SPRING SEMESTER 2022  
 FINAL STUDY DAY AND EXAM SCHEDULE**

LAST DAY OF CLASSES..... May 10, 2022

STUDY PERIOD ..... May 11, 2022

**FINAL EXAMS**

REGULAR CLASS TIME (Same Classroom)	EXAM TIME
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1<sup>st</sup> Day – Thursday, May 12, 2022

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

2<sup>nd</sup> Day – Friday, May 13, 2022

9:15 - 10:30	Tu/Fri	7:45 - 9:45
10:45 - 12:00	Tu/Fri	10:15 - 12:15
1:00 - 2:15	Tu/Fri	1:00 - 3:00
2:30 - 3:45	Tu/Fri	3:30 - 5:30

3<sup>rd</sup> Day – Monday, May 16, 2022

7:45 - 9:00	Tu/Fri	7:45 - 9:45
1:00 - 2:15	M/Th	10:15 - 12:15

\*\*\*\* ATTENTION \*\*\*\*

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

NO CLASSES WILL BE IN SESSION  
 AT THIS TIME

## **REGISTRATION ANNOUNCEMENT SPRING SEMESTER 2022**

### **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.

#### **REGISTRATION**

Students will log in to MyUTK using your NetID and password.

Log into MyUTK via the UTK homepage ([www.utk.edu](http://www.utk.edu)).

On the UTK homepage use either the 'Menu' at the top right and click on MyUTK or scroll down to the bottom left and you will also find MyUTK under the 'Communications' heading.

Before registering, clear and pay any financial holds. Holds are listed on MyUTK under the heading "For Your Review," located in the upper right-hand corner.

Scroll down to "UTK Student Registration Links" and click "Search for Classes" to look up sections and register.

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

If you have any questions, contact Charlene Hane in Student Affairs D-100, (931) 393-7228.

#### **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)-37228  
Budget and Finance Office: ..... 1-888-822-UTSI (8874)-37419  
Student Affairs ..... 1-888-822-UTSI (8874)-37228

#### **APPLICATION FOR ADMISSION**

No student will be allowed to register unless a completed application to the Graduate School of the University of Tennessee, Knoxville (UTK) is on file in the Registrar's Office. An Application for Admission to the UTK Graduate School must be completed online at <https://www.applyweb.com/utg> and accompanied by a \$60.00 non-refundable application fee made 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 three letters of recommendation when applying. International applicants will also need to include TOEFL scores. GRE scores are a requirement of all departments at UTSI except the Master of Science degree in Industrial Engineering/Engineering Management concentration. Please select UT Space Institute if you plan to attend the Tullahoma campus location. All applications need to be submitted online to the office of Graduate Admissions Knoxville, TN.

Graduate Research Assistantship applications need to be submitted to Charlene Hane, Student Affairs, University of Tennessee Space Institute, MS-7, Tullahoma, TN 37388-9700. Assistantship applications must include GRE test scores and three letters of recommendation. All international applicants will need to provide TOEFL test scores in addition to GRE's. Official transcripts and test scores should be sent to College Code 1843, Graduate Admissions Office, 201 Student Services Building, Knoxville, TN 37996-0221. Once admitted, a full admission will not be granted until all official test scores and degree confirmation are received in the Graduate Admissions Office in Knoxville. Please contact Charlene Hane at (931) 393-7228 or 888-822-8874 ext. 37228 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 Affairs, 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 Affairs, Office D-100, (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 Affairs 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**

Nine credit hours are considered full-time for graduate students. Graduate Research Assistants (GRAs) with one-half assistantship are required to register for at least 6 credit hours during the fall/spring semesters and 3 credit hours during the summer semester. GRAs must also enroll in one of the MABE 595 seminars during the first fall semester in attendance.

The residency requirement for doctoral students is 9 credit hours for two consecutive semesters or 6 credit hours for three consecutive semesters.

### **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 2022 must remove all INCOMPLETE GRADES by May 6, 2022. Contact Charlene Hane, Student Affairs 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 Affairs.

## **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, and other milestones depending upon the program.

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. For more information, go to: [https://catalog.utk.edu/content.php?catoid=27&navoid=3506#leave\\_absence\\_reinstate](https://catalog.utk.edu/content.php?catoid=27&navoid=3506#leave_absence_reinstate)

### **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 Affairs. 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 2021-2022 academic year is provided by United HealthCare Student Resources. The premium must be paid before registration. Contact the Student Affairs Office (room D-100 ext. 37228) 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 Day – May 11, 2022

Final Exams – May 12, 13 & 16, 2022

### **FINANCIAL CALENDAR, FEES, REFUNDS, AND TUITION**

Please click <http://onestop.utk.edu/tuition-fees/> link to the most current information.

The UTSI Budget and Finance Accounts Receivable Office will no longer accept payment for tuition and fees by credit card. 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/> .



## 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 online at <https://hilltopics.utk.edu/>

**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 1988 (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 2022 Course Listings**

**AEROSPACE ENGINEERING**

AE 500 Master's Thesis (1-15)  
SEC. 001 CRN 33731 Abedi  
002 CRN 33732 Kreth  
003 CRN 33733 Moeller  
004 CRN 33734 Schmisser  
005 CRN 33735 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. 002 CRN 23959 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 512 Viscous Flow (3)  
SEC. 001 CRN 23960  
TEXT: *Viscous Fluid Flow*; Frank M. White; McGraw Hill; 3<sup>rd</sup> Edition; ISBN 0072402318  
TIME: Tuesday & Thursday 2:40 – 3:55 E-113  
PROF: Dr. Mark Gragston

Derivation of fundamental equations of compressible viscous flow; boundary conditions for viscous heat-conducting flow; exact solutions for Newtonian viscous flow (Navier-Stokes) equations for special cases; similarity solutions. Thermal boundary layers, stability of laminar flows, transition to turbulence, 2-D turbulent boundary layer equations. Incompressible-turbulent mean flow, and compressible boundary layer flow.

*Registration Permission: Consent of instructor.*

AE 516 Data Measurement and Analysis (3)  
SEC. 001 CRN 34284 (Same as ME 516 001 CRN 34868)  
TEXT: *Random Data: Analysis and Measurement Procedures*; Julius S. Bendat and Allan G. Piersol; Wiley; 4<sup>th</sup> Ed.; ISBN 978-0-470-24877-5  
TIME: Monday & Wednesday 8:50 – 10:05 E-111

PROF: Dr. Phil Kreth

Various tools and techniques used in the analysis of random data. Data classification; statistics and probability; spectral and correlation functions; data acquisition fundamentals; input-output system models; and an introduction to modern data analysis procedures.

*Cross-listed: (Same as: Mechanical Engineering 516.)*

*(DE) Prerequisite(s): Undergrad degree in engineering. Consent of instructor.*

*Recommended Background: Logic-based programming knowledge (preferably within MATLAB) and some laboratory research.*

AE 566 Electric Propulsion (3)  
SEC. 001 CRN 28542  
TEXT: *Physics of Electric Propulsion* (textbook is available from Amazon.com); Robert G. Jahn; Dover Publications; ISBN 10:0486450406; 13: 978-0486450407  
TIME: Monday & Thursday 1:00 – 2:15 E-113  
PROF: Dr. Trevor Moeller

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.*

AE 590 Selected Engineering Problems (2-6)  
SEC. 001 CRN 23965 Abedi  
002 CRN 33737 Kreth  
003 CRN 33738 Moeller  
004 CRN 33739 Schmisser  
005 CRN 33740 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: Aerospace Ground Test Simulations and Facilities (3)  
SEC. 001 CRN 23969 (Same as ME 599 002 CRN 26621)  
TEXT: No Textbook – Instructor Notes Only  
TIME: Monday & Wednesday 10:30 – 11:45 E-111  
PROF: Dr. Milt Davis

- Provide a Fundamental Understanding of Aerospace Ground Test Simulation and Facilities
- How Ground Testing Provides Accurate Engineering Information
- Application of GT Information to Aerospace System
- Applicable Analysis Techniques
- Suitable Measurement Systems

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

AE 599 Special Topics: Combustion II – Combustion and Propulsion (3)  
SEC. 003 CRN 26620 (Same as ME 599 013 CRN 27651)  
TEXT: *Stabilization and Dynamics of Premixed Swirling Flames*; 1st Edition; Paul Palies;

July 2020; Available electronically at the library.

TIME: Tuesday & Thursday 10:30 – 11:45 E-113  
PROF: Dr. Paul Palies

This course follows Combustion I course and focuses on combustion dynamics and unsteady combustion process in gas turbine engines for commercial aviation. The goal is to describe the fundamentals of combustion processes at work in these propulsion systems including turbulent combustion and combustion instability. A major emphasis is on flame stabilization and combustion dynamics. Flame stabilization includes non-reacting flow processes and chemical reactions complexities associated to the flame front which are described. Combustion dynamics include phenomenon such as flashback, combustion oscillation, and blowoff. Elements of analytical, computational modeling and experimental measurements in the field are introduced and discussed. The operation and principles of gas turbines engines are also described. Finally, the perspective for research and development are outlined and include clean propulsion, sustainable aviation fuel, premixed combustion, and hydrogen combustion. Some of the material presented and this course are also relevant to other combustion and propulsion systems and specifics (fighter aircraft and rocket engines...) and will be discussed too.

This is a three-credit hour course. Combustion I is recommended, but not required.

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

AE 599 Special Topics: Introduction to Uncertainty Quantification (3)  
SEC. 005 CRN 25163 (Same as ME 599 006 CRN 25765)  
TEXT: *Measurement Uncertainty, Methods and Applications*; Ronald Dieck; International Society of Automation; 5<sup>th</sup> Edition; ISBN-10 1941546943, ISBN-13 978-1941546949  
TIME: Tuesday & Thursday 10:30 – 11:45 E-110  
PROF: Dr. Ragini Acharya

With the increasing complexity and more demanding requirements for engineered systems, it has become vital to include Uncertainty Quantification (UQ) in engineering analysis. This course will cover uncertainty identification and quantification arising from sources like measurement inaccuracies, material properties, boundary and initial conditions, and modeling approximations, numerical errors in the computational fluid dynamics based workflow including validation with experimental data, introduces forward and inverse propagation of uncertainty and uncertainty quantification methods, discuss potential implementations on use case studies to demonstrate the benefits of going beyond deterministic analysis. The competitive benefits of UQ include reduced development time and cost, improved designs, better understanding of risk, and quantifiable confidence in analysis results and engineering decisions. Unfortunately, there are obstacles and technical challenges which can prevent organizations from utilizing UQ methods and techniques in their engineering practice. This graduate course will enable students to be prepared for these technical challenges.

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

AE 599 Special Topics: Mathematical Methods in Physics I (3)  
SEC. 006 CRN 24962 (Same as BME 005 CRN 25957 and ME 599 015 CRN 28672)  
TEXT: *Mathematical Methods for Physicists*; Arfken et al; Academic Press; 2013  
TIME: TBD  
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.

*Recommended Background: Advanced calculus and differential equations.*

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

AE 600 Doctoral Research/Dissertation (3-15)  
SEC. 010 CRN 23980 Abedi  
013 CRN 23983 Kreth  
015 CRN 25295 Moeller  
016 CRN 33741 Schmisser  
017 CRN 33786 Zhang

*Grading Restriction: P/NP only.*

*Repeatability: May be repeated.*

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

AE 601 Doctoral Research Methodology (3)  
SEC. 002 CRN 28551  
TEXT: TBD  
TIME: TBD  
PROF: Dr. Jeffrey Reinbolt

Methods of planning and conducting original research and proposal writing.

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

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

*Registration Restriction(s): Minimum student level – graduate / doctoral students.*

*Registration Permission: Departmental approval.*

AE 681 Advanced Viscous Flow Theory (3)  
SEC. 001 CRN 28674  
TEXT: TBD  
TIME: Monday & Wednesday 12:10 – 1:25 E-110  
PROF: Dr. James Coder

Critical review of significance to governing equations. Nature of boundary layer approximation as singular perturbation problem. Uniqueness and existence of solutions. Applications of group theory. Special problem areas of interest to students.

*(DE) Prerequisite(s): 512, continuum mechanics, and Mathematics 562.*

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

AE 690 Selected Topics: Optical and Laser Methods in Aerodynamic Measurements (3)  
SEC. 004 CRN 26835  
TEXT: No Textbook Required  
TIME: Monday & Wednesday 2:40 – 3:55 Online  
PROF: Dr. Mark Gragston

Optics and optical measurements play an increasingly important role in various aspects of modern engineering, such as the design of sensors for automation, instrumentation for biomedical diagnostics, and for precise measurements of high-speed gas flows in wind tunnels. This course aims to provide basic knowledge of light, optical components, lasers, and the use of light for engineering measurements.

*Repeatability: May be repeated. Maximum 9 hours.*

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

*Registration Permission: Consent of instructor.*

## BIOMEDICAL ENGINEERING

BME 500 Master's Thesis (1-15)  
SEC. 012 CRN 25804 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 24061 (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: Tuesday & Thursday 8:50 – 10:05 E-111  
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, matrix determinants, matrix inversion, Cramer's rule, LU matrix decomposition. Vector spaces: spanning sets, vector norms, orthogonality, QR matrix decomposition, linear transformations. Eigenvalues and eigenvectors: characteristic polynomials, modal matrices, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices, solutions to systems of differential and difference equations. 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 560 Tissue Engineering and Regenerative Medicine (3)  
SEC. 002 CRN 33260  
TEXT: TBD  
TIME: Tuesday & Thursday 1:50 – 3:05 Online  
PROF: Dr. Sara Hanrahan

Develop an understanding of cell-cell interactions and the role of the extracellular matrix in the structure and function of normal and pathological tissues. Topics include the harvesting of stem cells from specific tissues, the use of artificial and natural scaffolds in three-dimensional tissue culture, and the role of maintaining the stem cell state in culture.

*(DE) Prerequisite(s): 503, 511, 521.*

BME 588 Cell and Tissue-Biomaterials Interaction (3)  
SEC. 003 CRN 33788

TEXT: TBD  
TIME: Tuesday & Thursday 10:30 – 11:45 Online  
PROF: Dr. Sara Hanrahan

Study of the fundamental principles involved in materials / cell and tissue interactions. Students will learn the underlying cellular and molecular mechanisms in host response to biomaterials. Emphasis will be placed on the integration of biomaterials/neuronal cells and tissue interactions into the design of neural implants (sensors, scaffolds, and therapeutics delivery modalities, etc.). Additional research paper assignments will be given to graduate students registered for this course.

*Recommended Background: BME 474.*

*Comment(s): Prior knowledge may satisfy prerequisites, with consent of instructor.*

BME 590 Selected Engineering Problems (2-6)  
SEC. 001 CRN 26717 Johnson

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

*Comment(s): Enrollment limited to students in problems option.*

*Registration Permission: Consent of advisor.*

BME 599 Special Topics: Mathematical Methods in Physics I (3)  
SEC. 005 CRN 25957 (Same as AE 599 006 CRN 24962 and ME 599 015 CRN 28672)  
TEXT: *Mathematical Methods for Physicists*; Arfken et al; Academic Press; 2013  
TIME: TBD  
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.

*Recommended Background: Advanced calculus and differential equations.*

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

BME 599 Special Topics: Neuroscience (3)  
SEC. 007 CRN 28695  
TEXT: TBD  
TIME: Tuesday & Thursday 7:10 – 8:25 Online  
PROF: Dr. Sara Hanrahan

*Repeatability: May be repeated. Maximum 12 hours.*

*Registration Permission: Consent of instructor.*

BME 600 Doctoral Research/Dissertation (3-15)  
SEC. 011 CRN 25805 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 28552  
TEXT: TBD  
TIME: TBD

PROF: Dr. Jeffrey Reinbolt

Intensive, individualized experience in reviewing literature, evaluating experimental or theoretical methods, planning a research project, and presenting research project plans orally and in writing.

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

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

*Registration Restriction(s): Minimum student level – graduate. PhD students only.*

*Registration Permission: Consent of instructor.*

BME 679 Mechanics for Dental Materials (3)

SEC. 001 CRN 34051

TEXT: *Materials Science for Dentistry*; B. W. Darvell; 9<sup>th</sup> Edition;

TIME: Monday, Wednesday & Friday 12:00 – 12:50

Zoom

PROF: Dr. Jackie Johnson

Dental Materials have some of the most exacting and varied requirements for mechanical strength. Uses of dental materials include fillings, crowns, bridges, implants, root canals, impressions and many others. The course will cover mechanical testing, such as deformation, strength testing, impact and creep; rheology, such as elasticity, flow and fillers; surfaces – wetting, bonding, adhesives and etching; Corrosion – basic considerations, passive metals and deliberate corrosion; casting – dimensional considerations and defects. There will also be a modeling component.

*(DE) Prerequisite(s): Mechanical Engineering 524, 530, or 559.*

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

## INDUSTRIAL ENGINEERING

IE 500 Master's Thesis (1-15)

SEC. 010 CRN 21682 Simonton UT Space Institute Campus

011 CRN 25080 Yu UT Space Institute Campus

016 CRN 33706 Yu Distance Education Campus

*Grading Restriction: P/NP only.*

*Repeatability: May be repeated.*

*Credit Level Restriction: Graduate credit only.*

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

IE 501 Design Project (1-3)

SEC. 016 CRN 34556 Tolk UT Space Institute Campus

017 CRN 34557 Tolk UT Distance Education Campus

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

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

*Comment(s): Enrollment limited to industrial engineering students in non-thesis option.*

*Credit Level Restriction: Graduate credit only.*

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

IE 502 Registration for Use of Facilities (1-15)

SEC. 003 CRN 34558 Yu UT Space Institute Campus

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.*

IE 529 Applications of Linear Algebra in Engineering Systems (3)  
SEC. 001 CRN 21706 UT Knoxville Campus (Video Recorded)  
002 CRN 29392 Distance Education Campus  
003 CRN 31827 UT Space Institute Campus  
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: Tuesday & Thursday 8:50 – 10:05 E-111  
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, matrix determinants, matrix inversion, Cramer's rule, LU matrix decomposition. Vector spaces: spanning sets, vector norms, orthogonality, QR matrix decomposition, linear transformations. Eigenvalues and eigenvectors: characteristic polynomials, modal matrices, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices, solutions to systems of differential and difference equations. 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; Materials Science and Engineering 529; Mechanical Engineering 529; Nuclear Engineering 529).*

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

IE 534 Financial Management for Engineering Managers (3)  
SEC. 001 CRN 33673 UT Knoxville Campus  
002 CRN 33674 Distance Education Campus  
003 CRN 33675 UT Space Institute Campus  
TEXT: TBD  
TIME: Monday 10:00 – 12:30 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.

IE 539 Strategic Management in Technical Organization (3)  
SEC. 001 CRN 33679 UT Knoxville Campus  
002 CRN 33681 Distance Education Campus  
003 CRN 33682 UT Space Institute Campus

TEXT: TBD  
TIME: TBD  
PROF: Dr. Lynn Reed

Strategic planning process and strategic management in practice; corporate vision and mission; product, market, organizational, and financial strategies; external factors; commercialization of new technologies; and competition and beyond.

*Recommended Background: Graduate standing in Engineering or Business.*

IE 542 Design of Experiments for Engineering Managers (3)  
SEC. 001 CRN 33684 UT Knoxville Campus  
002 CRN 33686 Distance Education Campus  
003 CRN 33687 UT Space Institute Campus  
TEXT: TBD  
TIME: Wednesday 9:30 – 12:00 E-113  
PROF: Dr. Tony Shi

Methodology for experiments in product, service, and process improvements. Factorial experiments, screening designs, variance reduction, and other selected topics for engineering managers. Taguchi philosophy and concepts. Optimization and response surface methods. Case studies.

*(RE) Prerequisite(s): Industrial Engineering 516.*

IE 600 Doctoral Research/Dissertation (3-15)  
SEC. 010 CRN 21719 Simonton UT Space Institute Campus  
019 CRN 32801 Simonton Distance Education Campus  
011 CRN 25079 Yu UT Space Institute Campus  
018 CRN 32800 Yu Distance Education Campus  
009 CRN 21718 Shi UT Space Institute Campus

*Grading Restriction: P/NP only.*

*Repeatability: May be repeated.*

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

## **MECHANICAL ENGINEERING**

ME 500 Master's Thesis (1-15)  
SEC. 001 CRN 21580 Abedi  
021 CRN 21600 Kreth  
022 CRN 21601 Moeller  
023 CRN 21602 Schmisser  
024 CRN 21603 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 25081 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 Convection Heat Transfer (3)  
SEC. 001 CRN 21616  
TEXT: Adrian Bejan; *Convection Heat Transfer*; 4th Edition; John Wiley  
TIME: Monday & Wednesday 2:45 – 4:00 Zoom  
PROF: Dr. Feng Yuan Zhang

Models and equations for fluid motion, the general energy equation, and transport properties. Exact, approximate, and boundary layer solutions for laminar flow heat transfer problems. Heat transfer in internal and external forced and buoyancy driven flows. Application of similarity concepts and analogies to convection heat transfer.

*Recommended Background: Undergraduate heat transfer course.*

ME 516 Data Measurement and Analysis (3)  
SEC. 001 CRN 34868 (Same as AE 516 001 CRN 34284)  
TEXT: *Random Data: Analysis and Measurement Procedures*; Julius S. Bendat and Allan G. Piersol; Wiley; 4<sup>th</sup> Ed.; ISBN 978-0-470-24877-5  
TIME: Monday & Wednesday 8:50 – 10:05 E-111  
PROF: Dr. Phil Kreth

Various tools and techniques used in the analysis of random data. Data classification; statistics and probability; spectral and correlation functions; data acquisition fundamentals; input-output system models; and an introduction to modern data analysis procedures.

*Cross-listed: (Same as: Aerospace Engineering 516.)*

*(DE) Prerequisite(s): Undergrad degree in engineering. Consent of instructor.*

*Recommended Background: Logic-based programming knowledge (preferably within MATLAB) and some laboratory research.*

ME 522 Thermodynamics II (3)  
SEC. 001 CRN 21618  
TEXT: *Introduction to Physical Gas Dynamics*; Walter G. Vincenti and Charles H. Kruger; Krieger Publishing Company; 2<sup>nd</sup>, 1975, 1986, 2002 reprint; ISBN 0882753096  
TIME: Tuesday & Thursday 10:30 – 11:45 Online  
PROF: Dr. Peng Zhao

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 21620 (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: Tuesday & Thursday

8:50 – 10:05

E-111

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, matrix determinants, matrix inversion, Cramer's rule, LU matrix decomposition. Vector spaces: spanning sets, vector norms, orthogonality, QR matrix decomposition, linear transformations. Eigenvalues and eigenvectors: characteristic polynomials, modal matrices, singular value decomposition. The Cayley-Hamilton theorem: matrix polynomials, functions of matrices, solutions to systems of differential and difference equations. 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; Nuclear Engineering 529).*

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

ME 569 Principles of Additive Manufacturing (3)

SEC. 002 CRN 33422

TEXT: TBD

TIME: Tuesday & Thursday

8:50 – 10:05

Online

PROF: Dr. Sudarsanam Babu

Fundamentals of additive manufacturing processes within the context of traditional manufacturing life cycle including the basics of product design, processing mechanics and materials science to highlight the advantages of additive manufacturing.

*Credit Restriction: Students cannot receive credit for both 469 and 569.*

*Recommended Background: Computer-aided design, materials science.*

*Registration Permission: Consent of Instructor.*

ME 570 Numerical Methods for Engineering (3)

SEC. 001 CRN 28707

TEXT: TBD

TIME: Tuesday & Thursday

8:50 – 10:05

E-110

PROF: Dr. Kivanc Ekici

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 590 Selected Engineering Problems (2-6)  
 SEC. 002 CRN 21626 Abedi  
 003 CRN 25514 Kreth  
 005 CRN 25515 Moeller  
 006 CRN 25516 Schmisser  
 007 CRN 25517 Zhang

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

ME 599 Special Topics: Aerospace Ground Test Simulations and Facilities (3)  
 SEC. 002 CRN 26621 (Same as AE 599 001 CRN 23969)  
 TEXT: No Textbook – Instructor Notes Only  
 TIME: Monday & Wednesday 10:30 – 11:45 E-111  
 PROF: Dr. Milt Davis

- Provide a Fundamental Understanding of Aerospace Ground Test Simulation and Facilities
- How Ground Testing Provides Accurate Engineering Information
- Application of GT Information to Aerospace System
- Applicable Analysis Techniques
- Suitable Measurement Systems

*Repeatability: May be repeated. Maximum 6 hours.*  
*Registration Permission: Consent of instructor.*

ME 599 Hypersonic Airbreathing Propulsion (3)  
 SEC. 005 CRN 26679  
 TEXT: TBD  
 TIME: Tuesday & Thursday 8:50 – 10:05 Online  
 PROF: Dr. Damiano Baccarella

*Repeatability: May be repeated. Maximum 6 hours.*  
*Registration Permission: Consent of instructor.*

ME 599 Special Topics: Introduction to Uncertainty Quantification (3)  
 SEC. 006 CRN 25765 (Same as AE 599 005 CRN 25163)  
 TEXT: *Measurement Uncertainty, Methods and Applications*; Ronald Dieck; International Society of Automation; 5<sup>th</sup> Edition; ISBN-10 1941546943, ISBN-13 978-1941546949  
 TIME: Tuesday & Thursday 10:30 – 11:45 E-110  
 PROF: Dr. Ragini Acharya

With the increasing complexity and more demanding requirements for engineered systems, it has become vital to include Uncertainty Quantification (UQ) in engineering analysis. This course will cover uncertainty identification and quantification arising from sources like measurement inaccuracies, material properties, boundary and initial conditions, and modeling approximations, numerical errors in the computational fluid dynamics based workflow including validation with experimental data, introduces forward and inverse propagation of uncertainty and uncertainty quantification methods, discuss potential implementations on use case studies to demonstrate the benefits of going beyond deterministic analysis. The competitive benefits of UQ include reduced development time and cost, improved designs, better understanding of risk, and quantifiable confidence in analysis results and engineering decisions.

Unfortunately, there are obstacles and technical challenges which can prevent organizations from utilizing UQ methods and techniques in their engineering practice. This graduate course will enable students to be prepared for these technical challenges.

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

*Registration Permission: Consent of instructor.*

ME 599 Special Topics: Combustion II – Combustion and Propulsion (3)  
SEC. 013 CRN 27651 (Same as AE 599 003 CRN 26620)  
TEXT: *Stabilization and Dynamics of Premixed Swirling Flames*; 1st Edition; Paul Palies;  
July 2020; Available electronically at the library.  
TIME: Tuesday & Thursday 10:30 – 11:45 E-113  
PROF: Dr. Paul Palies

This course follows Combustion I course and focuses on combustion dynamics and unsteady combustion process in gas turbine engines for commercial aviation. The goal is to describe the fundamentals of combustion processes at work in these propulsion systems including turbulent combustion and combustion instability. A major emphasis is on flame stabilization and combustion dynamics. Flame stabilization includes non-reacting flow processes and chemical reactions complexities associated to the flame front which are described. Combustion dynamics include phenomenon such as flashback, combustion oscillation, and blowoff. Elements of analytical, computational modeling and experimental measurements in the field are introduced and discussed. The operation and principles of gas turbines engines are also described. Finally, the perspective for research and development are outlined and include clean propulsion, sustainable aviation fuel, premixed combustion, and hydrogen combustion. Some of the material presented and this course are also relevant to other combustion and propulsion systems and specifics (fighter aircraft and rocket engines...) and will be discussed too.

This is a three-credit hour course. Combustion I is recommended, but not required.

*Repeatability: May be repeated. Maximum 6 hours*

*Registration Permission: Consent of instructor.*

ME 599 Special Topics: Mathematical Methods in Physics I (3)  
SEC. 015 CRN 28672 (Same as BME 599 005 CRN 25957 and AE 599 006 CRN 24962)  
TEXT: *Mathematical Methods for Physicists*; Arfken et al; Academic Press; 2013  
TIME: TBD  
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.

*Recommended Background: Advanced calculus and differential equations.*

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

*Registration Permission: Consent of instructor.*

ME 600 Doctoral Research/Dissertation (3-15)  
SEC. 015 CRN 21645 Abedi  
016 CRN 21646 Kreth  
018 CRN 21648 Moeller  
019 CRN 21649 Schmisser  
027 CRN 21657 Zhang

*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 28553  
TEXT: TBD  
TIME: TBD  
PROF: Dr. Jeffrey Reinbolt

Methods of planning and conducting original research and proposal writing.  
*Grading Restriction: Satisfactory/No Credit grading only.*  
*Repeatability: Maximum 6 hours. May be repeated once.*  
*Registration Restriction(s): Minimum student level – doctoral student.*  
*Registration Permission: Departmental approval.*

## **PHYSICS**

Phys 541 Electromagnetic Theory (3)  
SEC. 002 CRN 24775  
TEXT: *Electrodynamics*; Chaichian et al; Springer; 2016  
TIME: Monday, Wednesday & Friday 9:30 – 10:20 Zoom  
PROF: Dr. Christian Parigger

Review of electrostatics, magnetostatics, and quasi-static problems; Maxwell's field equations and their solutions in dielectric and conducting media; electrodynamics and relativity, retarded potentials and gauge transformations, radiation produced by accelerating charges.  
(DE) Prerequisite(s): 571.