Course Description

ENGR 1300 Engineering Problem Solving: 3 credits (contact hours: 2 lecture; 2 lab)

Broad introduction to the profession of engineering and its different disciplines, through the process of applying the principles of mathematics to solve real-life engineering problems and technical writing assignments. Math topics are presented within the context of engineering applications and reinforced through examples from engineering courses. Also introduces algorithm development through the use of the engineering analysis software MATLAB. Prerequisite: C or better in MATH 1421 (or concurrent enrollment), MATH 1426 (or concurrent enrollment) or MATH 2425 (or concurrent enrollment).

Course Meeting Times and Instructor Information

Section	Day	Time	Instructor	Email	Office	Faculty Profile
001	M W	8:00 – 9:50 AM	Dr. David Ewing	david.ewing@uta.edu	NH 634A	www.uta.edu/profiles/david%20-ewing
010	F	8:00 – 11:50 AM				
002	M W	10:00 – 11:50 AM	Dr. Rosie Kallie	TBA	TBA	TBA
003	M W	1:00 – 2:50 PM				
004	M W	3:00 – 4:50 PM				
006	T TH	11:00 AM – 12:50 PM				
005	M W	5:00 – 6:50 PM	Dr. Dibesh Joshi	djoshi@uta.edu	TBA	www.uta.edu/profiles/dibesh-joshi
007	T TH	1:00 – 2:50 PM				
008	T TH	3:00 – 4:50 PM				
009	T TH	5:00 – 6:50 PM				

Office Hours

Your professor will announce their office hours in class.

Electronic Communication

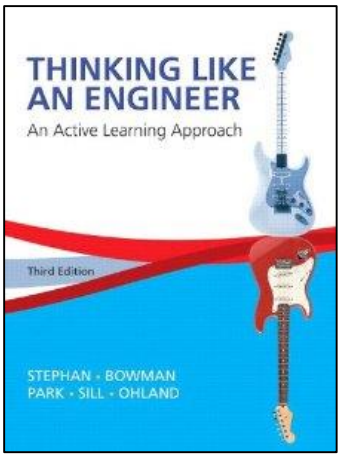
UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

Required Course Textbooks and Materials

⇒ **Textbook:** Thinking like an Engineer: An Active Learning Approach

For this course, you are required to have both a copy of the text and access to MyEngineeringLab (MEL). You must have the current edition of this textbook. Previous editions or international editions are not usable in this course.

You may purchase the textbook bundle that includes the national edition of this text, access to MEL, and access to MyWritingLab. The book is: Thinking like an Engineer: An



Active Learning Approach – Third Edition by Stephan, Bowman, Park, Sill, and Ohland; Prentice Hall, 2015 / ISBN-13: 978-0-13-359321-1 [White / Blue cover].

You may purchase the national version of the above book through another vendor. However, the national version of this text purchased through another vendor **does not include** MyEngineeringLab; students who choose to purchase this edition of the textbook will be required to purchase MyEngineeringLab separately from Pearson Publishing.

If you do not want a hardcopy version of the textbook and would like only an electronic copy of the text, you may purchase just the e-text version of this book. The electronic version must include MyEngineeringLab. We recommend you purchase the online version directly from Pearson Publishing. It is not a requirement that you have a hardcopy version of the textbook; an electronic version only of the text is acceptable. **However, you MUST purchase access to MyEngineeringLab, MyWritingLab, and the eText!**

If due to financial reasons you are unable to purchase the required text for this course, please speak to your instructor immediately. A large portion of the course grade requires the use of MyEngineeringLab, and failure to obtain access to the MEL system will result in a poor grade in this course.

⇒ FE calculator

*** **What is an FE calculator?** Only a calculator that meets the requirements used for the Fundamentals of Engineering (FE) exam may be used. Many of you will take this exam as seniors. A list of acceptable calculators can be found here: www.ncees.org/exams/calculator-policy. Acceptable include: Casio: all fx-115 model /HP: 33 or 35 models /TI: 30X or 36X models. If you have a calculator that you think may be acceptable, please ask for clarification. DO NOT ASSUME we will have a calculator available for you to use on quizzes or exams. You will not be allowed to use your cell phone as a substitute.*

⇒ Matlab 2015a

This WILL BE available through OIT later. You do NOT need to purchase a separate license. However, you MUST have it installed on a Windows operating system for this class and verify that it works BEFORE it becomes a problem.

⇒ Microsoft Office 2013

You will need to purchase this for yourself. As long as the version you get has Word, Excel, and Powerpoint, you may choose any edition you wish. Office 365 is acceptable as well. You also MUST have it installed on a Windows operating system for this class and verify that it works BEFORE it becomes a problem.

Course Materials

This course is computer-intensive. As such, you are expected to own a laptop in compliance with the University and Engineering Specification guidelines. If you experience laptop difficulties and require service, you are required to provide documentation to avoid being penalized.

For ENGR 1300, your computer must meet the minimum specifications. These specifications are given below. If your computer does not meet these minimum specifications, you must upgrade your computer. If you choose to attempt this course using a computer system that does not have these specifications, no exceptions will be made for computer issues.

For ENGR 1300, you must have access to a computer that will run a web browser. The required web browsers are Firefox and Chrome. Your computer must also have these recommended minimum specifications:

Grade Distribution

- ⇒ **Final Exam = 30%**
- ⇒ **Exams (2 @ 17.5%) = 35%**
- ⇒ **Group Project = 10%**
- ⇒ **Signature Assignment = 10%**
- ⇒ **Assignments = 15%**

Late and Previous Work Policy

No late work is accepted. No work from a previous semester is accepted in this course.

Grading Scale

A = 90 – 100 B = 80 – 89 C = 70 – 79 D = 60 – 69 F = 0 – 59

All grades in ENGR 1300 are TRUNCATED, consistent with UTA's GPR calculation policy. What this means is: if your final average is 86.3 you will receive a B; if it is 89.6 you will receive a B; if it is 89.9, you will receive a B.

Grade Reports

Students are responsible for tracking their own progress in the course. Grades in all ENGR courses are kept using an online grade book in BlackBoard. Your instructor will not issue a separate grade report.

Grade Correction Request

If there is an issue with any grade (including attendance records), the following policy applies:

- Describe the issue in writing within one week of the grade being recorded. All written appeals must be submitted in hardcopy using the "Grade Correction Request Form", which can be found online in the course management system. Supporting documentation, such as grading rubrics AND original work, must be attached. ***Requests issued via email or verbally will not be considered.***
- Once the appeal is submitted, it will be reviewed and the student will be notified of the decision in writing within two weeks of the request being submitted.
- If the situation is not resolved to the student's satisfaction, the student may issue the request again to the course coordinator within one week of receiving the decision.

Attendance

Students are expected to attend class every day.

- If the Instructor is late… Students are expected to wait 15 minutes for the instructor to arrive.
- If the student is late… Students are expected to arrive on time for class. If a student arrives after the professor has begun the instruction for the day, the student will be counted as late.
- If you are sick, we ask that you exercise good judgment about exposing classmates and faculty to contagious illnesses.

Out-of-Class Events

The course may require several hours of work to be completed outside of the classroom, such as exams and/or project work. These are usually conducted in the evenings. If you have an excused absence, you should discuss an alternative arrangement with your professor at least one week prior to the event.

Classroom Etiquette

- No eating or use of any tobacco products are permitted in any classroom.
- Cell phones, messaging devices, and music players (MP3, on laptop) should be turned off and stored during class. Having your cell phone out during class will result in dismissal from class. Headphones/earbuds should be removed during class.
- Students should conduct themselves in a professional manner at all times. If behavior in class is disruptive, the instructor reserves the right to dismiss the student from the class. This includes inappropriate comments or behavior toward the instructor, UTAs, or fellow students. The determination of whether classroom behavior is disruptive or inappropriate will be made by the instructor and is not open for interpretation.

- The unauthorized use of applications such as instant messaging, social media, or computer games will result in dismissal from class. In addition, if any of your electronic devices displays any offensive or vulgar images you will be dismissed from class. The determination of whether an image is offensive will be made by the instructor and is not open for interpretation.
- You are expected to behave in a professional manner and give any speaker your undivided attention. Use of any electronic devices, sleeping, or working on any assignments not pertaining to the current lecture will result in dismissal from class.

Emergency Exit Procedures

Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is located in two locations. For most everyone, exit through the door on the instructor's right side. There is a staircase directly around the corner. For traffic considerations, some students may exit the door on the instructor's left side and continue right down the hall. There is another set of stairs at the end. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Drop Policy

Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/aao/fao/).

Exam Specifics

For the exams and final exam, you will be allowed to use a pencil, eraser, FE calculator, and one 8.5 x 11 inch handwritten notes page (front and back). You will not be allowed to access either your hardcopy textbook or the online textbook during the quizzes and exam.

Make sure you know when the exam will be given. These times are available through the schedule posted to BlackBoard.

Evening Study Sessions

In ENGR 1300, extra help is provided for assignments and projects during the evening, called the Engineering Clinic. The sessions are conducted by the In-Class Teaching Assistants, or ITAs, and are intended for ENGR 1300. Clinics for other classes, such as math, chemistry, etc., are available in other portions of campus.

ITAs will attend class during the day with the students and have help sessions available for students Monday through Thursday from 7 – 10 pm in ERB 435. Actual days may vary due to scheduling conflicts that may arise, which will be announced via email before the evening in question. Students may attend any time during the week that is convenient for the student, and no appointment is necessary. No formal activities are planned; help is provided on an individual (as time permits) or small group basis and is student-driven.

Students should note these sessions are different than one-on-one tutoring. The ITAs are more coaches or mentors in the problem solving process, and often help several students at the same time. The ITAs will aid in problem solution checking or with minor questions about procedures. The ITAs will not lecture on material or help if the student has not attempted the assignment; students with major conceptual questions will be directed to contact the professor. If students wish to have individual attention on a topic or assignment, the use of professor office hours is the best choice.

The Engineering Clinic is available on a first-come first-serve basis. If the room reaches capacity, students may be turned away for safety (room capacity) reasons. Students should plan accordingly, and should anticipate the Engineering Clinic to be full or unavailable immediately before a large project or homework deadline. Beginning a project the day before it is due, and expecting the Engineering Clinic to be available for extensive help, is unrealistic.

The Engineering Clinic is a service offered to aid student learning. This is an opportunity for you to get help with course materials in the evening. If a student is rude or hostile toward a ITA, the student will be required to meet with the course coordinator and possibly banned from further use of the clinic sessions. Students are expected to behave in a professional manner at all times. The course coordinator reserves the right to change the Engineering Clinic schedule during the semester at their discretion.

Student Support Services

UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources.

The English Writing Center (411LIBR)

Hours are 9 am to 8 pm Mondays-Thursdays, 9 am to 3 pm Fridays and Noon to 5 pm Saturdays and Sundays. Walk In Quick Hits sessions during all open hours Mon-Thurs. Register and make appointments online at http://uta.mywconline.com. Classroom Visits, Workshops, and advanced services for graduate students and faculty are also available. Please see www.uta.edu/owl for detailed information.

Americans with Disabilities Act

The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the Americans with Disabilities Act (ADA). All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Student Feedback Survey

At the end of each term, students enrolled in classes categorized as “lecture,” “seminar,” or “laboratory” shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student’s feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit http://www.uta.edu/sfs.

Final Review Week

A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabus. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final

examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Academic Integrity

Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

> *I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*
> *I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System Regents' Rule 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

A. Any breach of the principles outlined in the Academic Integrity Statement is considered an act of academic dishonesty.

B. Academic dishonesty is further defined as:

   1. Giving, receiving, or using unauthorized aid, including the inappropriate use of electronic devices, on any work submitted to fulfill academic requirements. In examination situations, all electronic devices must be off and stowed unless otherwise authorized by the instructor;
   2. Plagiarism, which includes the intentional or unintentional copying of language, structure, or ideas of another and attributing the work to one's own efforts;
   3. Attempts to copy, edit, or delete computer files that belong to another person or use of computer accounts that belong to another person without the permission of the file owner or account owner;

C. All academic work submitted for grading or to fulfill academic requirements contains an implicit pledge and may contain, at the request of an instructor, an explicit pledge by the student that no unauthorized aid has been received.

D. It is the responsibility of every member of the UTA community to enforce the Academic Integrity Policy.

So What Exactly is Cheating?

Cheating:

- Allowing someone else to obtain and use all or part your work.
- Obtaining and using part of someone's work and submitting it as your own, with or without their knowledge.
- Several people completing one assignment and turning in multiple copies, all represented (implicitly or explicitly) as individual work. This includes but is not limited to creating a single worksheet or program, making electronic copies, and changing the name information for submission.
- Stealing an examination or a solution from the instructor or a posting area.
- Using any part of someone else's work without the proper acknowledgement. This includes downloading information (text or pictures) from the web and not citing the source of the information.
- Conversing by voice or ANY communication device during an exam or quiz.
- Use of notes not authorized by the instructor during an exam or quiz.

Not Cheating:

- Discussion of assignments on a theoretical level to understand what is being asked.
- Getting or giving help on how to solve minor syntax errors.
- Submission of one assignment for a group of students if group work is explicitly permitted.
- Turning in work done with the help of the instructor or designated class assistants.
- Working in a group to understand a problem solving methodology.

Title IX

The University of Texas at Arlington is committed to upholding U.S. Federal Law "Title IX" such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit www.uta.edu/titleIX.

Topical Outline

The approximate number of class hours and percentage of semester spent on each topic is included; based on class schedule in Fall 2015. This is a blended class environment; students are expected to complete some work in class, and some work online and outside of class each week. Please note topics are not presented here in chronological order.

- **Course Mechanics – 8 hours – 13%**
  - Course Introduction
  - Exam Reviews
  - Exams
- **Dimensions & Units – 12 hours – 20%**
  - Conversion of units as single values and within equations
  - Fundamental and derived dimensions; base and derived units
  - Problems related to density, energy, force, mass, moles, power, pressure, specific gravity, temperature, voltage and weight
  - Understanding the relationship and importance of units in solving complex equations
  - Use of estimation and reasonableness in problem solving
- **Graphical Problem Solving Procedures – 6 hours –10%**
  - Graphical representation and interpretation of data
- **Trendlines and Data Analysis – 6 hours – 10%**
  - Interpretation of trendline in terms of physical phenomena
  - Introduction to three trend types (linear, power and exponential)
  - Reinforcement of concepts of units and graphing through data analysis
- **Algorithms – 5 hours – 9%**
  - Creating algorithms by hand
  - Creating pseudo-code algorithms
  - Drawing a flowchart of a given algorithm
- **Input & Output– 2 hours – 3%**
  - Definition and discussion of **fprintf**, **input**, **menu**, **load**, and **save** functions
  - Discussion of special string characters (\n, \\, %s, %f, etc)
  - Discussion of Excel I/O
- **Functions & Programs –6 hours – 10%**
  - Anatomy of a proper function / program
  - Creating a program / function with proper documentation
  - Definition of a function and of a program
  - Handling functions with multiple input and/or output variables
  - Syntax and order of execution for MATLAB commands
  - Syntax and order of operations for mathematical expressions
  - Understanding input and output of functions
  - Variable data types (string / number / array / matrix / cell)
- **Matrix Operations – 2 hours – 3%**
  - Applying a built-in function to an array or matrix
  - Building and entering arrays and matrices in MATLAB
  - Definition of array and matrix
  - Discussion of matrix arithmetic (addition, subtraction, multiplication)
  - Replacing, adding, deleting elements, rows, or columns of a matrix
  - Term-by-term operations (multiplication, raising to a power) basics of matrix multiplication
  - Transposing matrices: definition and MATLAB operator
- **Plotting – 6 hours –10%**
  - Creating a figure with a single plot with multiple data series on the plot
  - Creating a figure with multiple plots using **subplot**
  - Creating proper plots with MATLAB using built-in functions (**title, xlabel, ylabel, legend, axis, grid, markers**)
  - Discussion of **plot** function
  - Discussion of **polyfit** function

- **Logic & Conditional Statements – 7 hours – 12%**
  - Converting written sentences into a structured conditional statement
  - Definition and discussion of conditional statements
  - Definition and discussion of **else, elseif, end, and if** operators
  - Definition of all logical operators (&&, ||, ~, &, | (bit-wise))
  - Definition of all relational operators (**<, >, <=, >=, ~=, ==**)

The schedule, policies, procedures and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement, and / or to ensure better student learning.

Course Objectives

The main goals of this course are:

- to prepare students for the rigor of future engineering classes,
- to provide students with a solid foundation of basic engineering skills, and
- to introduce students to the different engineering majors and career options.

The specific goals of this course are:

Course Objectives	ABET
Identify basic and derived dimensions and units; Express observations in appropriate units and perform conversions when necessary; Apply basic principles from mathematical and physical sciences, such as trigonometry, Hooke's Law, and the ideal gas law, to analyze engineering problems.	a, e
Use graphical techniques to create "proper" plots, sketch functions, and determine graphical solutions to problems.	e
Describe and interpret mathematical models in terms of physical phenomena. Determine an appropriate mathematical model to describe experimental data using physical knowledge, then apply the model to form graphical solutions to engineering problems.	b, e, k
Communicate technical information effectively by correctly apply graphing conventions and composing clear and concise descriptions of experiments and projects;	g
Formulate and justify a solution to an engineering problem within a team structure	d, e
Generate a written (numbered list/pseudo code) description and sketch a flowchart/concept map of an algorithm of a problem or process.	c, e
Formulate algorithmic steps into code utilizing input instructions, formatted output, looping structures, conditional statements, and file input/output.	a, e
Read, write, interpret, and debug MATLAB programs and functions. Trace the value of variables through MATLAB program and function execution. Verify output against a published or manually calculated solution.	e, k
Use MATLAB to enhance problem solution techniques, including entering and formatting data; applying functions, including mathematical, statistical, and trigonometric; create and format data into graphs.	k
Use MATLAB to fit experimental data with a trendline; describe and interpret mathematical models in terms of physical phenomena	b, e, k

Students may vary in their competency levels on these abilities. You can only expect to acquire these abilities only if you honor all course policies, attend class regularly, complete all assigned work in good faith and on time, and meet all other course expectations of you as a student.

ABET Competencies

This course is designed to satisfy the following ABET Competencies. For more information, refer to www.abet.org.

Engineering programs must demonstrate that their graduates have:

(a) an ability to apply knowledge of mathematics, science, and engineering

(b) an ability to design and conduct experiments, as well as to analyze and interpret data

(c) an ability to design a system, component, or process to meet desired needs

(d) an ability to function on multi-disciplinary teams

(e) an ability to identify, formulate, and solve engineering problems

(f) an understanding of professional and ethical responsibility

(g) an ability to communicate effectively

(h) the broad education necessary to understand impact of engineering solutions in global and societal context

(i) a recognition of the need for, and an ability to engage in life-long learning

(j) a knowledge of contemporary issues

(k) an ability to use techniques, skills, and modern engineering tools necessary for engineering practice