MSET 5020 Design of Experiments

Instructor Contact

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Communication Expectations:

General Guidelines

- Remember that college communication is still professional communication. Use correct spelling and grammar and always double-check your response before hitting send or reply. Do not use slang and limit the use of emoticons.
- Use standard, readable fonts, sizes, and colors and avoid writing in all caps.
- Be mindful of tone in online communication as it lacks the nonverbal cues of face-to-face communication that provide clarity and context to conversations.
- Respect the personal identities of others based on gender, sexuality, race, ethnicity, class, and/or culture.
- Respect the privacy of yourself, your instructor, and your peers. Keep in mind what you reveal and do not reveal, particularly if this information involves personal health and/or classroom performance, such as grades.
- Give people the benefit of the doubt. Though there may be a computer between you, there are people on the other side of the screen.
- Do not make assumptions about others’ technological skills. Technological skills vary across a variety of factors, including experience, age, culture, etc.

Communicating via Email

- Check the syllabus before asking a question about the course and let the instructor know you checked the syllabus before asking. Instructors put a lot of time into making syllabi as comprehensive as possible for students.
- Use a descriptive subject line to get the instructor’s attention. Instructors receive a lot of emails and a descriptive subject line helps them identify student inquiries more efficiently.
- Be concise and to the point.

Discussion Board Communication

- Treat your posts like the professional communication that they are. Use correct spelling and grammar and always double-check a response before hitting send or reply. Do not use slang and limit the use of emoticons.
- Read all the messages in a thread before replying so you do not repeat something one of your peers may have already said.
- Avoid replies such as “I agree” and instead explain why you agree or do not agree.
• Show your work by sharing resources and utilizing citations.
• When disagreeing, do not make personal attacks or use language that discriminates based on gender, sexuality, race, ethnicity, class, and/or culture.

Course Description
A study of industrial analytical techniques used to develop new products and new technologies, including the use of engineering software for design purposes.

Course Structure
All course activity is done online; there are no required face-to-face sessions within the course and no requirements for on-campus activity. The course is following regular academic semester (15 weeks) and each module is designed for being taken during each week. The final examination follows the official dates posted regularly in the UNT registrar’s office webpage.

Course Prerequisites or Other Restrictions
The prerequisite is a basic knowledge of statistics. The installation of MINITAB, version 18 or higher version is mandatory (www.minitab.com).

Course Objectives
By the end of this course, students will be able to:

1. Apply mathematical statistical techniques to different contexts in engineering practice, to analyze the design process of products and services.
2. Plan, model and design experiments using engineering software for design purposes.
3. Apply the optimization of variables with design of experiments and statistical techniques, for their use in product and process improvement in industrial scenarios.
4. Discuss how industrial design of experiments methodologies like Design for Six Sigma and Taguchi Philosophy could benefit product and process development processes.

Materials
• Software: Minitab (www.minitab.com) version 18 or higher version.

Teaching Philosophy
The approach for teaching this course is based on a problem solving orientation, using knowledge, information and data from the real world, extracted from current research or scientific publications. The student is able to propose a research topic and to discuss about how to solve a particular problem from his/her field, taking into account all the statistical tools for designing experiments provided in this course.

Technical Requirements & Skills
Minimum Technology Requirements
The software used in this course is MINITAB 18 or higher version.
- **Minitab Statistical Software (Windows)**
  - Operating System Windows 8 or 8.1, Windows 10
  - RAM* 64-bit systems: 4 GB of memory or more recommended
  - Processor Intel® Pentium® 4 or AMD Athlon™ Dual Core, with SSE2 technology
  - Hard Disk Space 2 GB (minimum) free space available
  - Screen Resolution 1024 x 768 or higher
  - Connectivity An internet connection is required for activation of trial and single-user licenses
  - Browser A web browser is required for Minitab Help. Chrome or Edge is recommended.
  - Additional required software will be installed with the application: Microsoft Visual C++ Redistributables for Visual Studio 2017
  - *Memory recommendations depend on data size.

- **Minitab Statistical Software (macOS)**
  - Operating System Mojave (macOS 10.14) or Catalina (macOS 10.15)
  - Hard Disk Space 500 MB (minimum) free space available

- **Browser** A web browser is required for Minitab Help. Chrome or Safari is recommended.

- **Canvas Technical Requirements** (https://clear.unt.edu/supported-technologies/canvas/requirements)

**Computer Skills & Digital Literacy**

The learner should be able to use the following technical tools and software resources:

- **Using Canvas**: The student should be proficient in the use of Canvas. In case the student needs training there are several online student resources the students can use for getting training: (https://clear.unt.edu/canvas/student-resources)
- **Using email with attachments**
- **Downloading and installing software**
- **Using spreadsheet programs**
- **Using presentation and graphics programs**

**Rules of Engagement**

- Treat your instructor and classmates with respect in email or any other communication.
- Always use your professors’ proper title: Dr. or Prof., or if in doubt use Mr. or Ms.
- Unless specifically invited, don’t refer to your instructor by first name.
- Use clear and concise language.
- Remember that all college level communication should have correct spelling and grammar (this includes discussion boards).
- Avoid slang terms such as “wassup?” and texting abbreviations such as “u” instead of “you.”
- Use standard fonts such as Arial, Calibri or Times new Roman and use a size 10 or 12 point font
- Avoid using the caps lock feature AS IT CAN BE INTERPRETTED AS YELLING.
- Limit and possibly avoid the use of emoticons like :) or 😊.
- Be cautious when using humor or sarcasm as tone is sometimes lost in an email or discussion post and your message might be taken seriously or sound offensive.
- Be careful with personal information (both yours and other’s).
• Do not send confidential information via e-mail

See these Engagement Guidelines (https://clear.unt.edu/online-communication-tips) for more information.

Success in an Online Course
While the online classroom shares many similarities with the face-to-face classroom, success in online education requires certain skills and expectations that students may not be aware of. The following link provides useful tips for “How to Succeed as an Online Student” (https://clear.unt.edu/teaching-resources/online-teaching/succeed-online).

Getting Help

Technical Assistance
UIT Help Desk: http://www.unt.edu/helpdesk/index.htm
Email: helpdesk@unt.edu
Phone: 940-565-2324
In Person: Sage Hall, Room 130
Walk-In Availability: 8am-9pm
Telephone Availability:
• Sunday: noon-midnight
• Monday-Thursday: 8am-midnight
• Friday: 8am-8pm
• Saturday: 9am-5pm
Laptop Checkout: 8am-7pm

For additional support, visit Canvas Technical Help (https://community.canvaslms.com/docs/DOC-10554-4212710328)

Student Support Services
UNT provides mental health resources to students to help ensure there are numerous outlets to turn to that wholeheartedly care for and are there for students in need, regardless of the nature of an issue or its severity. Listed below are several resources on campus that can support your academic success and mental well-being:

• Student Health and Wellness Center (https://studentaffairs.unt.edu/student-health-and-wellness-center)
• Counseling and Testing Services (https://studentaffairs.unt.edu/counseling-and-testing-services)
• UNT Care Team (https://studentaffairs.unt.edu/care)
• UNT Psychiatric Services (https://studentaffairs.unt.edu/student-health-and-wellness-center/services/psychiatry)
• Individual Counseling (https://studentaffairs.unt.edu/counseling-and-testing-services/services/individual-counseling)

Other student support services offered by UNT include

• Registrar (https://registrar.unt.edu/registration)
• Financial Aid (https://financialaid.unt.edu/)

University of North Texas | 4
Course Requirements

The following Module Worksheet contains all Module-level learning objectives.

<table>
<thead>
<tr>
<th>Module</th>
<th>Module-level Learning Objectives</th>
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<tbody>
<tr>
<td><strong>Week 1</strong></td>
<td>Upon successful completion of this module, the learner will be able to:</td>
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<tr>
<td>1.</td>
<td>Read and download the course syllabus.</td>
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<tr>
<td>2.</td>
<td>Navigate the Learning Management System.</td>
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<tr>
<td>3.</td>
<td>Learn the Fundamentals of Design of Experiments (DOE)</td>
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<tr>
<td>4.</td>
<td>Install and navigate the Minitab software.</td>
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<td>5.</td>
<td>Identify main statistical techniques used on Design of Experiments.</td>
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<tr>
<td><strong>Week 2</strong></td>
<td>Identify descriptive statistics for constructing and interpreting visual data displays.</td>
</tr>
<tr>
<td>2.</td>
<td>Analyze data sets for applying descriptive statistics.</td>
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<tr>
<td><strong>Week 3</strong></td>
<td>Use linear regression techniques for building empirical models to engineering and scientific data.</td>
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<tr>
<td>2.</td>
<td>Describe relationships among multiple variables using regression techniques.</td>
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<tr>
<td><strong>Week 4</strong></td>
<td>Design and conduct engineering experiments involving a single factor with an arbitrary number of levels.</td>
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<tr>
<td>2.</td>
<td>Analyze data sets of design of experiments involving single factor.</td>
</tr>
<tr>
<td><strong>Week 5</strong></td>
<td>Understand the difference between fixed and random factors.</td>
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<tr>
<td>2.</td>
<td>Estimate variance components in an experiment involving random factors.</td>
</tr>
<tr>
<td>3.</td>
<td>Analyze data sets of design of experiments involving random factors.</td>
</tr>
<tr>
<td><strong>Week 6</strong></td>
<td>Design and conduct experiments involving several factors using the factorial design approach.</td>
</tr>
<tr>
<td>2.</td>
<td>Examine data sets on factorial design approach.</td>
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</tbody>
</table>
| Week 7 | 1. Explain how to use the two-level series of factorial designs.  
2. Describe how to run two-level factorial design in blocks.  
3. Analyze two-level factorial design. |
|--------|-------------------------------------------------------------------|
| Week 8 | 1. Demonstrate superior knowledge on descriptive statistics and design of experiments involving a single factor and factorial design.  
2. Complete the Middle Term Examination |
| Week 9 | 1. Explain how to use the two-level series of factorial designs with three or more factors  
2. Describe how to run two-level factorial design in blocks and adding center points.  
3. Analyze two-level factorial design with three or more factors. |
| Week 10 | 1. Design and conduct experiments involving several factors using the fractional factorial design approach.  
2. Examine fractional factorial designs. |
| Week 11 | 1. Use Response Surface Methodology (RSM) for process optimization experiments.  
2. Construct plots using the Response Surface Methodology. |
| Week 12 | 1. Identify the utility of design of experiments in Taguchi Philosophy  
2. Examine data sets applying statistical tools to analyze and improve the design process according to Taguchi.  
3. Complete a quiz on Taguchi Philosophy. |
| Week 13 | 1. Characterize the principles and tools for improving the innovation process according to the Six Sigma Philosophy.  
2. Complete a quiz on Six Sigma Philosophy. |
| Week 14 | 1. Know how to implement design of experiments in Six Sigma Philosophy.  
2. Complete an exercise on applying statistical tools to analyze and improve the design process according to Six Sigma. |
| Week 15 | 1. Demonstrate superior knowledge on design of experiments using factorial design approach and its implementation in the industry.  
2. Complete the Final Examination. |

**Grading Policies**

**Course Activities & Assessments (1000 points total)**

**Activities**
- Weekly Module Activities/Interactions (13 @ 10 points each, or 13% of total)

**Assessments**
- Exercises (12 @ 25 points each or 30% of total)
- Quizzes (2 @ 35 each or 7% of total)
- Middle Term Exam (250 points or 25%)
Final Exam (250 points or 25%)

Grading
- A: 90-100% (Outstanding, excellent work. The student performs well above the minimum criteria.)
- B: 80-89% (Good, impressive work. The student performs above the minimum criteria.)
- C: 70-79% (Solid, college-level work. The student meets the criteria of the assignment.)
- D: 60-69% (Below average work. The student fails to meet the minimum criteria.)
- F: 59 and below (Sub-par work. The student fails to complete the assignment.)

Late Work
All work turned in after the deadline will receive a grade of zero unless the student has a university-excused absence and provides documentation with 48 hours of the missed deadline.

Extra Credit
There are no extra credit opportunities in this course.

Course Evaluation
Student Perceptions of Teaching (SPOT) is the student evaluation system for UNT and allows students the ability to confidentially provide constructive feedback to their instructor and department to improve the quality of student experiences in the course.

Course Policies
Assignment Policy
Each module has specific interactions/activities and assignments to be done by the students. All of them should have indicated the submission deadline and their weight as points or as a percentage of the total points for this course.

The University is committed to providing a reliable online course system to all users. However, in the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will extend the time windows and provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and contact the UNT Student Help Desk: helpdesk@unt.edu or 940.565.2324 and obtain a ticket number. The instructor and the UNT Student Help Desk will work with the student to resolve any issues at the earliest possible time.

Examination Policy
Students will be evaluated by a Middle Term Examination, by a Final Examination and by Quizzes. There is no any restriction to use open books or to use Internet browsers. However, since each evaluation is time constraint, and the problems/exercises will be displayed in a random manner, it is required to be focused on the tests and to use reading and analytical skills for answering all the questions and solving all the exercise in a timely manner.
Instructor Responsibilities and Feedback

Grade Disputes
The student is required to wait 24 hours before contacting me to dispute a grade. Within that time, the instructor will review the assignment details and reflect on the quality of the work the student turned in.

Communication
Most general questions should go through the Q & A forum in the Discussion Board area. If the student has a private question, he/she can contact the instructor, who should be able to respond within 24 hours on weekdays (usually sooner).

Instructor Feedback on Assignments
The instructor should return feedback on all assignments within 1 week of the due date. If the instructor is unable to return feedback he will post an Announcement to let everyone know when it can be expected.

Attendance Policy
Since this course will be delivered online, the attendance will be recorded with the postings in the Discussion Board. Visit the University of North Texas’ Attendance Policy (http://policy.unt.edu/policy/15-2-) to learn more.

Class Participation
The class participation will be taken through the Discussion Board. Each discussion is posted by modules, and the student should be able to see the requirements and the deadlines for participating in each of them.

Syllabus Change Policy
This syllabus is subject to change at any time during the semester with changes to be announced in class.

UNT Policies

Academic Integrity Policy
Academic Integrity Standards and Consequences. According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University. [Insert specific sanction or academic penalty for specific academic integrity violation.]

ADA Policy
The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking reasonable accommodation must first register with the Office of Disability Access (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with a reasonable accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request reasonable accommodations at any time, however, ODA notices of reasonable accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of reasonable accommodation for every
semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. For additional information, refer to the Office of Disability Access website at http://www.unt.edu/oda. You may also contact ODA by phone at (940) 565-4323.

Emergency Notification & Procedures
UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Blackboard for contingency plans for covering course materials.

Retention of Student Records
Student records pertaining to this course are maintained in a secure location by the instructor of record. All records such as exams, answer sheets (with keys), and written papers submitted during the duration of the course are kept for at least one calendar year after course completion. Course work completed via the Blackboard online system, including grading information and comments, is also stored in a safe electronic environment for one year. Students have the right to view their individual record; however, information about student’s records will not be divulged to other individuals without proper written consent. Students are encouraged to review the Public Information Policy and the Family Educational Rights and Privacy Act (FERPA) laws and the University’s policy. See UNT Policy 10.10, Records Management and Retention for additional information.

Acceptable Student Behavior
Student behavior that interferes with an instructor’s ability to conduct a class or other students’ opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Dean of Students to consider whether the student's conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classroom, labs, discussion groups, field trips, etc. Visit UNT’s Code of Student Conduct (https://deanofstudents.unt.edu/conduct) to learn more.

Access to Information - Eagle Connect
Students’ access point for business and academic services at UNT is located at: my.unt.edu. All official communication from the University will be delivered to a student’s Eagle Connect account. For more information, please visit the website that explains Eagle Connect and how to forward e-mail Eagle Connect (https://it.unt.edu/eagleconnect).

Student Evaluation Administration Dates
Student feedback is important and an essential part of participation in this course. The student evaluation of instruction is a requirement for all organized classes at UNT. The survey will be made available during weeks 13, 14 and 15 [insert administration dates] of the long semesters to provide students with an opportunity to evaluate how this course is taught. Students will receive an email from "UNT SPOT Course Evaluations via IASystem Notification" (no-reply@iasystem.org) with the survey link. Students should look for the email in their UNT email inbox. Simply click on the link and complete the
survey. Once students complete the survey they will receive a confirmation email that the survey has been submitted. For additional information, please visit the SPOT website (http://spot.unt.edu/) or email spot@unt.edu.

Sexual Assault Prevention
UNT is committed to providing a safe learning environment free of all forms of sexual misconduct, including sexual harassment sexual assault, domestic violence, dating violence, and stalking. Federal laws (Title IX and the Violence Against Women Act) and UNT policies prohibit discrimination on the basis of sex, and therefore prohibit sexual misconduct. If you or someone you know is experiencing sexual harassment, relationship violence, stalking, and/or sexual assault, there are campus resources available to provide support and assistance. UNT’s Survivor Advocates can assist a student who has been impacted by violence by filing protective orders, completing crime victim’s compensation applications, contacting professors for absences related to an assault, working with housing to facilitate a room change where appropriate, and connecting students to other resources available both on and off campus. The Survivor Advocates can be reached at SurvivorAdvocate@unt.edu or by calling the Dean of Students Office at 940-565-2648. Additionally, alleged sexual misconduct can be non-confidentially reported to the Title IX Coordinator at oeo@unt.edu or at (940) 565 2759.

Important Notice for F-1 Students taking Distance Education Courses

Federal Regulation
To read detailed Immigration and Customs Enforcement regulations for F-1 students taking online courses, please go to the Electronic Code of Federal Regulations website (http://www.ecfr.gov/). The specific portion concerning distance education courses is located at Title 8 CFR 214.2 Paragraph (f)(6)(i)(G).

The paragraph reads:
(G) For F-1 students enrolled in classes for credit or classroom hours, no more than the equivalent of one class or three credits per session, term, semester, trimester, or quarter may be counted toward the full course of study requirement if the class is taken on-line or through distance education and does not require the student's physical attendance for classes, examination or other purposes integral to completion of the class. An on-line or distance education course is a course that is offered principally through the use of television, audio, or computer transmission including open broadcast, closed circuit, cable, microwave, or satellite, audio conferencing, or computer conferencing. If the F-1 student's course of study is in a language study program, no on-line or distance education classes may be considered to count toward a student's full course of study requirement.

University of North Texas Compliance
To comply with immigration regulations, an F-1 visa holder within the United States may need to engage in an on-campus experiential component for this course. This component (which must be approved in advance by the instructor) can include activities such as taking an on-campus exam, participating in an on-campus lecture or lab activity, or other on-campus experience integral to the completion of this course.

If such an on-campus activity is required, it is the student’s responsibility to do the following:
(1) Submit a written request to the instructor for an on-campus experiential component within one week of the start of the course.

(2) Ensure that the activity on campus takes place and the instructor documents it in writing with a notice sent to the International Student and Scholar Services Office. ISSS has a form available that you may use for this purpose.

Because the decision may have serious immigration consequences, if an F-1 student is unsure about his or her need to participate in an on-campus experiential component for this course, s/he should contact the UNT International Student and Scholar Services Office (telephone 940-565-2195 or email internationaladvising@unt.edu) to get clarification before the one-week deadline.

Student Verification
UNT takes measures to protect the integrity of educational credentials awarded to students enrolled in distance education courses by verifying student identity, protecting student privacy, and notifying students of any special meeting times/locations or additional charges associated with student identity verification in distance education courses.

See UNT Policy 07-002 Student Identity Verification, Privacy, and Notification and Distance Education Courses (https://policy.unt.edu/policy/07-002).

Use of Student Work
A student owns the copyright for all work (e.g. software, photographs, reports, presentations, and email postings) he or she creates within a class and the University is not entitled to use any student work without the student’s permission unless all of the following criteria are met:

- The work is used only once.
- The work is not used in its entirety.
- Use of the work does not affect any potential profits from the work.
- The student is not identified.
- The work is identified as student work.

If the use of the work does not meet all of the above criteria, then the University office or department using the work must obtain the student’s written permission.

Download the UNT System Permission, Waiver and Release Form

Transmission and Recording of Student Images in Electronically-Delivered Courses

1. No permission is needed from a student for his or her image or voice to be transmitted live via videoconference or streaming media, but all students should be informed when courses are to be conducted using either method of delivery.

2. In the event an instructor records student presentations, he or she must obtain permission from the student using a signed release in order to use the recording for future classes in accordance with the Use of Student-Created Work guidelines above.
3. Instructors who video-record their class lectures with the intention of re-using some or all of recordings for future class offerings must notify students on the course syllabus if students' images may appear on video. Instructors are also advised to provide accommodation for students who do not wish to appear in class recordings.

Example: This course employs lecture capture technology to record class sessions. Students may occasionally appear on video. The lecture recordings will be available to you for study purposes and may also be reused in future course offerings.

No notification is needed if only audio and slide capture is used or if the video only records the instructor's image. However, the instructor is encouraged to let students know the recordings will be available to them for study purposes.