

COVID HEADER

If Texas Tech University campus operations are required to change because of health concerns related to the COVID-19 pandemic, it is possible that this course will move to a fully online delivery format. Should that be necessary, students will need to have access to a webcam and microphone for remote delivery of the class. Additionally, students will need to have access to Blackboard, Zoom, & Raider Email.

ARCH 3352 BUILDING INFORMATION TECHNOLOGY

COLLEGE OF ARCHITECTURE, TEXAS TECH UNIVERSITY

SPRING 2021

INSTRUCTORS

Catherine Söderberg Esper, Coordinator, Visiting Assistant Professor, catherine.soderberg@ttu.edu
Andres Gandara, Instructor, andrgand@ttu.edu



COURSE TITLE

BUILDING INFORMATION TECHNOLOGY

CATALOG DESCRIPTION

3352. Building Information Technology (3). Prerequisites: ARCH 1353, 2355, and 3350. Analysis of communication of technical information and the process of preparing documents for building construction utilizing Building Information Modeling (BIM).

COURSE DESCRIPTION

This course will investigate the relationship between information data, building, and technology through a series of related assignments and explorations. Design technology shapes how we gather and use information. Building Information Modeling (BIM) software allows designers to embed data within a working 3D model. Environmental analysis programs and simulations allow designers to better understand the effects of their proposals. Parametric models allow designers to create informationally responsive spaces, forms and assemblies.

This course will progress through four major projects. The aim of this course is to learn how to; model a comprehensive parametric model and site topography context in Revit, create sheets, perform environmental analyses, import point cloud data from drone imagery, produce fundamental construction drawings, and render and generate virtual reality animations. The course deliverables will consist of four projects. The course will be supplemented by lectures, procedural demonstrations and virtual workshop sessions.

PROJECT 1 - MODEL (5 weeks)

Using Revit, students will develop a complex building information model of the El Paso Museum of Art along with additional surrounding building context and site topography. Students will reference the provided plans to model the interior and the exterior of the museum in detail. Students will learn to model standard architectural components such as floors, walls, doors, windows, roofs, structural systems, curtain walls, stairs etc. Students will also learn how to import furniture and mechanical units such as elevator lifts as CAD blocks from external websites.

PROJECT 2 - ITERATE (5 weeks)

Students will learn *Dynamo*- a parametric design plug in for Revit that enables designers to create visual logic to explore conceptual designs and automate tasks. To elaborate on P1, students will design and document a long-spanning parametric shading canopy for the Arts Festival Plaza adjacent to the museum. Students will do so by building panelized dynamic assemblies of geometric variation through *Dynamo* or via generic adaptive modeling capabilities in Revit.

PROJECT 3 - ANALYZE (3 weeks)

Elaborating on P2, students will be introduced to environmental analysis features and plug-ins for Revit such as *Insight*, *Light Analysis* and *Flow Design*. These softwares will assist in performing energy and cost analyses, interior illuminance and external air flow analyses on their design iterations. Students will identify the environmental inputs and analyze the performative effects of solar, windflow and daylight on their building information model. Students will also learn how to construct a textured point cloud of site surroundings and ground topography from aerial drone imagery with *Recap 360*.

PROJECT 4 - DOCUMENT (3 weeks)

For the final deliverable, students will collect and refine their semester's work within an organized and comprehensive drawing set. Drawing sets will show appropriate use of notes, tags, grid lines, dimensions, reference annotations and a schedule of the new canopy's assembly parts. As a supplemental visualization tool, students will learn real-time rendering plug-in *Lumion* to generate a VR simulation walk through of their designs to be paired with the Oculus Rift VR headset.

STUDENT LEARNING OBJECTIVES

1. An ability to manipulate and coordinate complex and detailed digital models of building systems, and complete construction drawings through parametric modeling (BIM) software *Revit* & *Dynamo*.
2. A technical understanding of major structural, mechanical, environmental and architectural systems developed in their class project.
3. An understanding of appropriate material systems and construction details developed in the class project.
4. An ability to assess a building using various environmental analysis tools in order to make critical design decisions.
5. An ability to organize and layout a set of construction drawings
6. An ability to design and draw details that define a building's construction.
7. An ability to create and transform spatial and tectonic solutions applied to building design and technology.
8. An ability to convey drawings and diagrams through clear but advanced graphical techniques and methods.

STUDENT PERFORMANCE OBJECTIVES

1. Utilize modeling & drawing software (Revit & Dynamo) as a design tool.
2. Utilize various softwares and plug-ins (Insight, Light Analysis, Flow Design, Recap 360, Lumion) to explore buildings’ environmental impacts.
3. Develop an ability to make design decisions based on external environments.
4. Develop an ability to express various assignments, projects, and concepts, through digital mediums.
5. Develop an individual graphic language and identity.
6. Create a working set of technical documents.
7. Develop ability to describe building elements and technology necessary to realize a functioning built form.
8. Learn drawing conventions, standards and techniques in order to describe and delineate the materials, assemblies and details of all elements that control how a building is built.

MEANS OF EVALUATION

1. Deliverables
 - Weeks 1-5 Project 1
 - Weeks 6-10 Project 2
 - Weeks 11-13 Project 3
 - Week 14-16 Project 4
 - Week 17 Final Digital Submission
2. Methods of Assessment
 - a. Completion of deliverables in a timely manner
 - b. Weekly project progress
 - c. Thoughtful engagement with critical questions regarding context

TEACHING METHODS

1. Instructional Lectures
2. Tutorial Videos

COURSE SCHEDULE

	S	M	T	W	R	F	S
1	17	18	19	20	Jan 21 Classes Begin First Day of BIT	22	23
2	24	25	26 Zoom Session 12:00-1:20 Lecture (Both Sections) Intro to P1	27	28 Zoom Session 12:00-1:20 Lab (Your Instructor)	29	30
3	31	Feb 1	2 Zoom Session 12:00-1:20 Lecture (Both Sections) Progress Pin Up Mural	3	4 Zoom Session 12:00-1:20 Lab (Your Instructor)	5	6
4	7	8	9 Zoom Session 12:00-1:20 Lecture (Both Sections) Progress Pin Up Mural	10	11 Zoom Session 12:00-1:20 Lab (Your Instructor)	12	13

5	14	15	16 Zoom Session 12:00-1:20 Lecture (Both Sections) P1 Due Final Upload to Mural Intro to P2	17	18 Zoom Session 12:00-1:20 Lab (Your Instructor)	19	20
6	21	22	23 Zoom Session 12:00-1:20 Lecture (Both Sections) Progress Pin Up Mural	24	25 Zoom Session 12:00-1:20 Lab (Your Instructor)	26 No Class	27
7	28	Mar 1	2 Zoom Session 12:00-1:20 Lecture (Both Sections) Progress Pin Up Mural	3	4 Zoom Session 12:00-1:20 Lab (Your Instructor)	5	6
8	7	8	9 Zoom Session 12:00-1:20 Lecture (Both Sections) Progress Pin Up Mural	10	11 Zoom Session 12:00-1:20 Lab (Your Instructor)	12	13
9	14	15	16 Zoom Session 12:00-1:20 Lecture (Both Sections) Progress Pin Up Mural	17	18 Zoom Session 12:00-1:20 Lab (Your Instructor)	19 No Class	20
10	21	22	23 Zoom Session 12:00-1:20 Lecture (Both Sections) P2 Due Final Upload to Mural Intro to P3	24	25 Zoom Session 12:00-1:20 Lab (Your Instructor)	26	27
11	28	29	30 Zoom Session 12:00-1:20 Lecture (Both Sections) Progress Pin Up Mural	31	Apr 1 Zoom Session 12:00-1:20 Lab (Your Instructor)	2	3
12	4	5 No Class	6 Zoom Session 12:00-1:20 Lecture (Both Sections) Progress Pin Up Mural	7	8 Zoom Session 12:00-1:20 Lab (Your Instructor)	9	10
13	11	12	13 Zoom Session 12:00-1:20 Lecture (Both Sections) P3 Due Final Upload to Mural Intro to P4	14	15 Zoom Session 12:00-1:20 Lab (Your Instructor)	16	17
14	18	19	20 Zoom Session 12:00-1:20 Lecture (Both Sections) Progress Pin Up Mural	21	22 Zoom Session 12:00-1:20 Lab (Your Instructor)	23	24

15	25	26	27 No Class	28	29 No Class	30	May 1
16	2	3	4 Zoom Session 12:00-1:20 Last Day of Class (Your Instructor) Progress Pin Up Mural	5	6	7	8
17	9	10	11 Final Project Due				

SUGGESTED TEXTS

Autodesk Revit Architecture Essentials by Ryan Duell, Tobias Hathron & Tessa Reist Hathron.
Mastering Autodesk Revit 2021 by Yori, Kim, Kirby
The Architect's Studio Companion by Edward Allen & Joseph Iano
Building Codes Illustrated, 4th Ed. by Francis D.K. Ching & Steven R. Winkel
Building Construction Illustrated, 4th Ed. by Francis D.K. Ching
Materials, Structures, Standards by Julia McMorrough
The Professional Practice of Architectural Detailing by Osamu A. Wakita & Richard M. Linde
The Professional Practice of Architectural Working Drawings by Osamu A. Wakita, Richard M. Linde & Nagy R. Bakhoun

COURSE REQUIREMENTS

Software: Revit 2021, Dynamo, Insight, Light Analysis, Flow Design, Recap 360, Lumion, Adobe Creative Suite (5-6) Design Standard (includes Illustrator, Photoshop, InDesign and Acrobat Pro) or Creative Cloud. Please be advised, using illegal copies of software will cause unexpected results and will not be an excuse for delay of assignment deadlines.

GRADING

Grades will be calculated as follows:

Project 1 **25%**
Project 2 **25%**
Project 3 **20%**
Project 4 **20%**
Progress and Participation **10%**

NAAB CRITERIA

B.4 Technical Documentation — *Ability* to make technically clear drawings, prepare outline specifications, and

construct models illustrating and identifying the assembly of materials, systems, and components appropriate for a building design.

B.7 Building Envelope Systems & Assemblies — *Understanding* of the basic principles involved in the appropriate selection and application of building envelope systems relative to fundamental performance, aesthetics, moisture transfer, durability, and energy and material resources.

B.8 Building Materials and Assemblies — *Understanding* of the basic principles used in the appropriate selection of

interior and exterior construction materials, finishes, products, components, and assemblies based on their inherent performance, including environmental impact and reuse.

B.10 Financial Considerations — *Understanding* of the fundamentals of building costs, which must include project financing methods and feasibility, construction cost estimating, construction scheduling, operational costs, and life-cycle costs.

ATTENDANCE POLICY

Students are responsible for attending all scheduled class meetings for the full class period. Once a student reaches two unexcused absences, they will be asked to meet with the instructor. A total of four absences is considered excessive, requiring the student to drop the class or receive a grade of “F” in compliance with the drop deadlines. All absences are considered unexcused except for absences due to religious observance or officially approved trips.

Note: Failure to work in class with undivided attention, the lack of appropriate tools and materials, any tardiness, leaving early, lack of participation, general socializing, disruptive behavior, etc. will be regarded as absences. You are not allowed to work on assignments from other classes during this class.

II. COVID-19 INFORMATION

FACE COVERINGS ARE REQUIRED

Texas Tech University requires that students wear face coverings while in classes, while otherwise in campus buildings, and when social distancing cannot be maintained outdoors on campus.

SIGNAGE

Be attentive to signage posted at external and some classroom doorways that indicates entry and exit ways, gathering and queuing spaces, and availability of masks and hand sanitizer.

SEATING ASSIGNMENTS

The purpose of assigned seating is to assist in contact tracing, if necessary, and to augment social distancing. Students are expected to sit at a minimum of six feet apart. There will also be an orderly procedure, designed to ensure social distancing, for exiting the classroom.

ILLNESS-BASED ABSENCE POLICY

If at any time during this semester you feel ill, in the interest of your own health and safety as well as the health and safety of your instructors and classmates, you are encouraged not to attend face-to-face class meetings or events. Please review the steps outlined below that you should follow to ensure your absence for illness will be excused. These steps also apply to not participating in synchronous online class meetings if you feel too ill to do so and missing specified assignment due dates in asynchronous online classes because of illness.

1. If you are ill and think the symptoms might be COVID-19-related:
 - a. Call Student Health Services at 806.743.2848 or your healthcare provider. After hours and on weekends contact TTU COVID-19 Helpline at 806.743.2911.
 - b. Self-report as soon as possible using the Dean of Students COVID-19 webpage. This website has specific directions about how to upload documentation from a medical provider and what will happen if your illness renders you unable to participate in classes for more than one week.
 - c. If your illness is determined to be COVID-19-related, all remaining documentation and communication will be handled through the Office of the Dean of Students, including notification of your instructors of the period of time you may be absent from and may return to classes.
 - d. If your illness is determined not to be COVID-19-related, please follow steps 2.a-d below.

2. If you are ill and can attribute your symptoms to something other than COVID-19:
 - a. If your illness renders you unable to attend face-to-face classes, participate in synchronous online classes, or miss specified assignment due dates in asynchronous online classes, you are encouraged to visit with either Student Health Services at 806.743.2848 or your healthcare provider. Note that Student Health Services and your own and other health care providers may arrange virtual visits.
 - b. During the health provider visit, request a “return to school” note;
 - c. E-mail the instructor a picture of that note;
 - d. Return to class by the next class period after the date indicated on your note.

Following the steps outlined above helps to keep your instructors informed about your absences and ensures your absence or missing an assignment due date because of illness will be marked excused. You will still be responsible to complete within a week of returning to class any assignments, quizzes, or exams you miss because of illness.

3. If you have interacted with individual(s) who have tested positive for COVID-19: Maintain a list of those persons and consult Student Health Services at 806-743-2911 or your primary care provider on next steps.

Do not return to class until you are medically cleared by your Healthcare Provider.

III. UNIVERSITY REQUIRED STATEMENTS

ADA STATEMENT

Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor’s office hours. Please note: instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, please contact Student Disability Services in West Hall or call 806-742-2405.

ACADEMIC INTEGRITY STATEMENT

Academic integrity is taking responsibility for one’s own class and/or course work, being individually accountable, and demonstrating intellectual honesty and ethical behavior. Academic integrity is a personal choice to abide by the standards of intellectual honesty and responsibility. Because education is a shared effort to achieve learning through the exchange of ideas, students, faculty, and staff have the collective responsibility to build mutual trust and respect. Ethical behavior and independent thought are essential for the highest level of academic achievement, which then must be measured. Academic achievement includes scholarship, teaching, and learning, all of which are shared endeavors. Grades are a device used to quantify the successful accumulation of knowledge through learning. Adhering to the standards of academic integrity ensures grades are earned honestly. Academic integrity is the foundation upon which students, faculty, and staff build their educational and professional careers. [Texas Tech University (“University”) Quality Enhancement Plan, Academic Integrity Task Force, 2010]

RELIGIOUS HOLY DAY STATEMENT

"Religious holy day" means a holy day observed by a religion whose places of worship are exempt from property taxation under Texas Tax Code §11.20. A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is

absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence. A student who is excused under section 2 may not be penalized for the absence; however, the instructor may respond appropriately if the student fails to complete the assignment satisfactorily.

DISCRIMINATION, HARASSMENT, AND SEXUAL VIOLENCE STATEMENT

Texas Tech University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from gender and/or sex discrimination of any kind. Sexual assault, discrimination, harassment, and other Title IX violations are not tolerated by the University. Report any incidents to the Office for Student Rights & Resolution, (806)-742-SAFE (7233) or file a report online at titleix.ttu.edu/students. Faculty and staff members at TTU are committed to connecting you to resources on campus. Some of these available resources are: TTU Student Counseling Center, 806- 742-3674, <https://www.depts.ttu.edu/scc/>(Provides confidential support on campus.) TTU 24-hour Crisis Helpline, 806-742-5555, (Assists students who are experiencing a mental health or interpersonal violence crisis. If you call the helpline, you will speak with a mental health counselor.) Voice of Hope Lubbock Rape Crisis Center, 806-763-7273, voiceofhopelubbock.org (24-hour hotline that provides support for survivors of sexual violence.) The Risk, Intervention, Safety and Education (RISE) Office, 806-742-2110, <https://www.depts.ttu.edu/rise/> (Provides a range of resources and support options focused on prevention education and student wellness.) Texas Tech Police Department, 806-742- 3931,<http://www.depts.ttu.edu/ttpd/> (To report criminal activity that occurs on or near Texas Tech campus.)

CIVILITY IN THE CLASSROOM STATEMENT

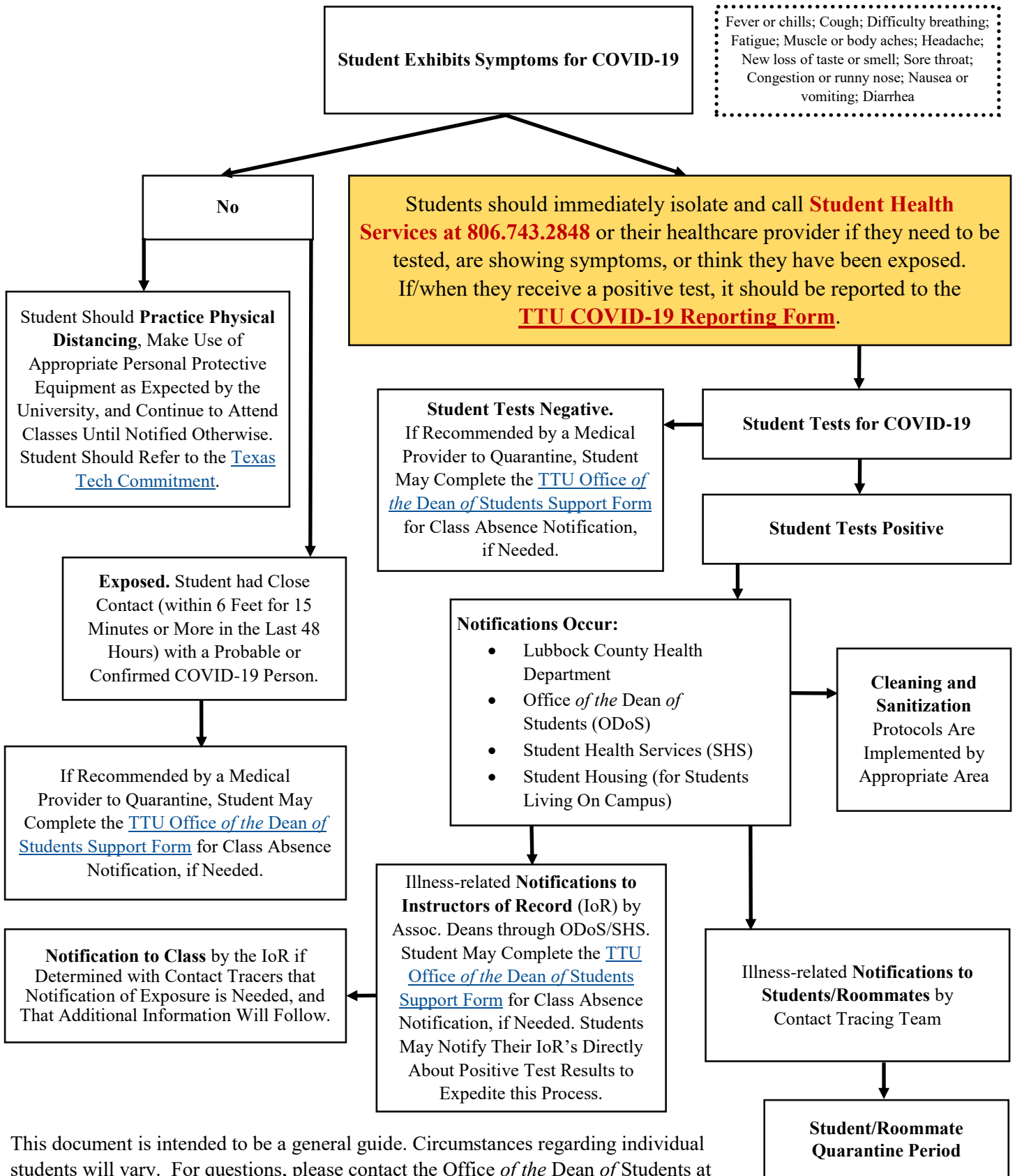
Texas Tech University is a community of faculty, students, and staff that enjoys an expectation of cooperation, professionalism, and civility during the conduct of all forms of university business, including the conduct of student–student and student–faculty interactions in and out of the classroom. Further, the classroom is a setting in which an exchange of ideas and creative thinking should be encouraged and where intellectual growth and development are fostered. Students who disrupt this classroom mission by rude, sarcastic, threatening, abusive or obscene language and/or behavior will be subject to appropriate sanctions according to university policy. Likewise, faculty members are expected to maintain the highest standards of professionalism in all interactions with all constituents of the university (www.depts.ttu.edu/ethics/matadorchallenge/ethicalprinciples.php).

LGBTQIA SUPPORT STATEMENT

I identify as an ally to the lesbian, gay, bisexual, transgender, queer, intersex, and asexual (LGBTQIA) community, and I am available to listen and support you in an affirming manner. I can assist in connecting you with resources on campus to address problems you may face pertaining to sexual orientation and/or gender identity that could interfere with your success at Texas Tech. Please note that additional resources are available through the Office of LGBTQIA within the Center for Campus Life, Student Union Building Room 201, www.lgbtqia.ttu.edu, 806.742.5433.”



COVID-19 Positive Student Test Notification and Protocol



This document is intended to be a general guide. Circumstances regarding individual students will vary. For questions, please contact the Office of the Dean of Students at 806.742.2984.