SAN ANTONIO
TEXAS PREFRESHMAN ENGINEERING PROGRAM

STUDENT AND PARENT HANDBOOK

PREP Mission

PREP is a national summer program preparing middle and high school student for advanced studies and careers in STEM fields. Program priorities include improving participation of women and underrepresented minorities in these fields, promoting collaboration between educational institutions and industry, and innovating coursework to develop students' critical-thinking skills.

Dear TexPREP Student,

Congratulations and welcome to TexPREP! You are now beginning a program that will make a big difference in your life, both academically and personally. We appreciate the commitment you and your family have made for you to attend TexPREP this summer and we encourage you to take full advantage of it. Use this time to think about your dreams for the future and to build upon the skills and knowledge needed to make those dreams a reality. Work hard to learn, achieve, explore and discover; because investing in TexPREP is investing in yourself!

The TexPREP staff, Instructors, Program Assistant Mentors (PAs), Site Director, Counselors, and office staff, are all here to assist you and make TexPREP the best it can be, for you. We encourage you to communicate with all the staff members about any concerns you may have and also about what you need to do your very best.

Succeeding at TexPREP means working hard and being responsible and accountable. You were given this opportunity because we believe that you can do it, and do it well. TexPREP is worth your efforts, and, when you graduate, you will know you have accomplished something you can truly be proud of. TexPREP graduates have demonstrated outstanding success in high school, college, and later in their careers. We know you will, too!

Let's make this a wonderful and productive summer for you and us!

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INTRODUCTION

As a TexPEP student, your first priority is to learn! An orientation is held the first day of classes to provide students with an overview of the program. The topics discussed include TexPREP goals and expectations, conduct, roll call procedures, library privileges, transportation, counseling assistance, guest speakers, lunch procedures, attendance requirements, classroom rules, grading procedures, and curriculum content.

Placement tests are conducted on the first day, and, based on these, you will be assigned to a group of similar students. **Note:** Any student who feels they have been placed in a group that is not challenging enough should speak to their Site Director to request a re-evaluation. Each group is assigned a Program Assistant Mentor (PA), who is a college student usually majoring in math, science, or engineering. The PA's role is to serve as a guide and mentor for each student throughout the program.

On a daily basis, the PAs will:

1. Conduct roll call and ensure student safety and appropriate behavior throughout each day.
2. Attend classes and labs with students, provide tutoring, and assist instructors, as needed.
3. Supervise Research and Study period.
4. Assist with the preparation of special TexPREP activities, including competitions and field trips.
5. Maintain records of students' work and grade daily student journals.

TYPICAL TexPREP SCHEDULE

A typical day at TexPREP consists of presentations by Career Awareness Seminar speakers, lectures, classes, homework, and special projects. Each day begins with roll call by PAs at a designated location. Students are given nametags that are to be worn at all times during the designated TexPREP hours; nametags are collected at the end of the day. Nametags have the student's name, identification number, and assigned PA's name.

The first activity of each day is a presentation by a Career Awareness Seminar speaker, who provide insight into job related experiences and career paths. Students are encouraged to interact with speakers during question and answer periods. Students are reminded to conduct themselves in a respectful and appropriate manner with all speakers. Remember, they are graciously donating their time to help you learn.

Following Career Awareness Seminar speakers, students attend classroom lectures, participate in laboratory assignments, and have a lunch break, usually from 12:00 p.m. until 1:00 p.m., daily.

TexPREP POLICIES AND PROCEDURES

The following policies and procedures must be observed at all TexPREP sites:

1. Students must attend all classes, unless excused by the Site Director.
2. Students must be on time for daily roll call and classes. If a student is going to be absent, tardy, or requesting an early dismissal, the parent or guardian must notify their assigned TexPREP site in writing or by calling the office 24 hours in advance to obtain an Excused Absence. Students must provide a written note from the parent or a physician upon returning to the TexPREP program. Students tardy five or more times and/or with five or more early dismissals, or a combination of absences/tardiness/early dismissals equivalent to 4 days of instruction will be removed from the program.
3. Excused absences are approved by the Site Director, only. A maximum of three excused absences is allowed for the program. On the fourth absence, the student will be dismissed. Please note that it is difficult to make up work after the second consecutive absence. Unexcused absences are not allowed and will result in dismissal from the program.
4. The dress code must be strictly adhered to. Students are to wear modest, comfortable, and appropriate clothing suitable for an academic environment. Articles of clothing that are strictly prohibited are: tank tops, inappropriate shorts (inseam must be 4” or greater), spandex clothing, slip dresses, sheer clothing, and shirts with offensive sayings. Caps are permitted only during special events held outside. Body jewelry is prohibited except for rings, studs, or other traditional jewelry worn in the ear. Tongue, eyebrow, and nose rings or studs are not permitted. Unconventional hair colors or hairstyles that are distracting and/or disruptive are prohibited.
5. Students must attend the graduation ceremony to complete the TexPREP program and receive a certificate. If absent within the excused absences of three (3) days on the closing day, then he/she will be allowed to be promoted, but will not receive a certificate. The student remains eligible to earn high school elective credit, if desired.
6. Students should only bring classroom material and personal care items to campus. TexPREP is not responsible for lost or damaged items. Cell phone use is at the discretion of the site staff.
7. Fireworks, guns or knives, or any other weapons are strictly prohibited and will result in immediate dismissal from the program.

8. Nametags are given out to students at the beginning of the day during roll call and must be worn at all times during the designated TexPREP hours. Any TexPREP staff member has the right to ask for a participant's nametag to be surrendered, if a violation of policy or rule has occurred. If this happens, both the student and parent will be notified and disciplinary action will be administered, as needed. At the end of the day nametags are collected.
9. Food and drinks are not allowed in the lecture halls, labs or classrooms. Smoking, alcohol, chewing gum, and gambling are not permitted.
10. Unruly, unsafe or inappropriate behavior is grounds for dismissal
11. Communication, including by social media, between minors and staff/counselors outside of official communications of the program for minors is prohibited.
12. Each site may have additional rules; for example, on some campuses students are not allowed to use elevators, unless written documentation is provided from a doctor.

MEDICATION

There are many legal issues involved in a student taking prescribed medication while at TexPREP. Generally, sites do not have access to a college/university health center, thus it is much easier, and safer, if arrangements can be made for the student to schedule taking their medication before or after attending TexPREP. When this is not possible and there is access to a health center, the following steps MUST be taken:

1. The Parental Permission Form must be completed and returned.
2. The Medication Description Form must be completed by the attending physician and returned to the College/University Health Center. This details times, dosages, potential side effects, etc.
3. The parent/guardian must personally deliver the medication to the College/University Health Center (depending upon the requirements of the individual TexPREP site).
4. College/University Health Center staff must be informed of procedures for administering any medication, and required documentation maintained.
5. All physician directions, including any reporting requirements, must be strictly adhered to.
6. The parent/guardian should be informed immediately, if any problems or concerns arise.

If a site does not have access to a health center, the parent/guardian must inform the Site Director that the parent/guardian will administer either non-prescription or prescription medication to their student (no TexPREP staff will administer drugs to a student). In most cases, students are not allowed to carry non-prescription nor prescription medication while at TexPREP.

ROLL CALL

Roll call is taken twice, daily. Punctual attendance at roll call is necessary. It is critical for student accountability and for staff to share information concerning special events, field trips, and special projects. The following rules must be complied with:

1. Be at your designated location on time and with your PA. It is recommended that you be 5 minutes early.
2. When roll is being called, remain quiet with your group. Do not interrupt the PA or disrupt any other groups.
3. If you fail to report for roll call, you will be considered absent and your parents/guardians will be notified immediately.
4. All restroom needs, water breaks, sharpening pencils, etc., should be taken care of before roll call.

LIBRARY USE

As a TexPREP student, you may have campus library privileges. This is a wonderful opportunity to take advantage of the many services a college library has to offer. Library books can be checked out in accordance with the TexPREP campus site policy. Students must pay for lost, late, or damaged books and will not be allowed to graduate unless all delinquent accounts are taken care of. Students will be notified prior to graduation, if they have any overdue books or charges.

At the same time as TexPREP, college students are also attending summer school and are using the library and other campus facilities. Keep in mind that we are guests on the campus and, as such, we must observe and respect the students, teachers and other faculty members involved in the summer college sessions. **Quiet and appropriate behavior is expected at all times**.

While in the library, it is important to remember the following:

1. You must wear your nametag at all times.
2. Study rooms are **off limits** to students at all times.
3. No food or drinks are allowed in the library.
4. No playing around in the library. Disciplinary action will be administered for inappropriate or disruptive behavior.
5. Begin leaving the library **10** minutes before roll call.
6. Use of the Internet is allowed only for appropriate research and under supervision.

TRANSPORTATION

Each student is responsible for their own transportation to and from their assigned TexPREP site. Participants (12 and older) will be issued a VIA bus pass which grants reduced VIA bus fare. For your safety, it is important to observe the following guidelines when riding a bus:

1. Sit near the front of the bus.
2. Sit with people you know.
3. Don't talk to strangers. If someone bothers you, tell the bus driver immediately.
4. Don't horseplay.
5. If lost, ask the bus driver for instructions.
6. Always carry extra change.
7. Always carry your VIA bus card (if issued).

VIA bus drivers and security staff are aware of TexPREP and work very hard to ensure student safety.

If a student will be picked up from a TexPREP site, it is important that the student and parent/guardian coordinate a consistent time and location (if not designated by the Site Director). **TexPREP staff will provide supervision only during official TexPREP hours. Due to safety concerns, students must not remain on campus after official TexPREP hours. If a student repeatedly violates this policy, they will be dismissed from the program.**

SUPPORT SERVICES

Counseling Services: TexPREP Counselors are responsible for offering student and staff support services for each campus. They may provide workshops and/or counseling on time management, peer pressure, self-esteem, test anxiety, goal setting, and personal concerns, if requested. Students may speak with Counselors individually or in groups and are encouraged to take advantage of these services. The Counselors' goal is to help students, learn, enjoy TexPREP, and achieve success.

Free/Reduced Lunch: TexPREP participates in the Summer Food Service Program (SFSP) sponsored by the Texas Department of Agriculture. Any student who qualifies for free or reduced lunch during the regular school year will also qualify for free or reduced lunch during TexPREP. In the case that 50% of the students at a particular TexPREP site qualify for free or reduced lunch, every student at that site will also be eligible to receive free or reduced lunch.

Academic Credit: The Texas Education Agency has authorized school districts to award one Career and Technology Education (CTE) Innovative Course elective credit to high school students for each successfully completed summer of TexPREP.
A copy of your transcript will be available at the end of the Closing Ceremony, please ask the Guidance Counselor at your school about this credit option. **Remember, the elective credit may be calculated into your GPA and effect your class rank.** You must have a final grade of 69.5 or better in order to complete TexPREP, successfully.

FUTURE SUMMERS OF TexPREP

TexPREP applications for following years are available online at
beginning November 1st, of each year. We encourage you submitted an application as early as possible.

UPREP: University PREP (UPREP) is open to former Year 3 and 4 TexPREP students and offers STEM related courses for college credit. In addition, UPREP students are given the opportunity to participate in student development workshops, volunteer opportunities, internships, and university research projects.

LIFE AFTER TexPREP

Surveys: Follow-up surveys are conducted annually by the TexPREP Central Office. Surveys assist with keeping track of the students who have successfully completed at least one year of the program. TexPREP is interested in following the progress of former students throughout their high school and college educations. The results of surveys are utilized in numerous ways, such as distributing such information to scholarship and internship programs and college recruiters. Also, we share the success of our students with TexPREP sponsors and benefactors to encourage them to continue their support of TexPREP. Surveys are also used to improve the program in various ways. Thus, completing and returning the survey promptly allows us to help you, as well as other future TexPREP students.

Opportunities and Enrichment Programs: Students are encouraged to take advantage of other nation-wide enrichment programs after completing four summers of TexPREP. Through TexPREP's annual follow-up survey, we are able to share and release information about former participants, so they can learn about opportunities to attend other college and national enrichment programs.

Job Opportunities: Students who have completed at least one year of college with a 2.5 or higher GPA are eligible to work as a Program Assistant Mentor (PA) for TexPREP. The PA position is full time during the entirety of seven week TexPREP session. PA duties consist of monitoring and mentoring a group of 20 or more students during TexPREP, accompanying and

assisting students in the classroom, supervising a Research and Study period, maintaining students' records, and assisting with TexPREP's daily operations. At the conclusion of the program, a selected group of PAs may continue to assist with the following activities: preparing a final report, assisting with follow-up surveys, and evaluating the program. The rate of pay depends upon the sponsor, level of college education and major, and previous TexPREP experience.

FREQUENTLY ASKED QUESTIONS

What if …

…you need to speak to a TexPREP administrator? Tell your PA.
…you are late to TexPREP? Go to your designated speaker room, immediately find your PA, and tell them that you have arrived.
…you have found a book or personal item that is not yours? Turn it in to your PA.
…you need a parking permit? Tell your PA.
…you need to call your parents? Ask your PA.
…you will be absent? Refer to "Regulations."
…you misplace your name tag? Tell your PA.
…anyone on campus exhibits behavior that is inappropriate or makes you feel uncomfortable? Find and tell any TexPREP staff member, immediately.
…you have lost something? Tell your PA, immediately.
…you want advice about personal problems, college, test anxiety, or peer pressure? Tell your PA that you would like to speak to the Counselor.
…you want to withdraw from PREP? Talk to your PA or a counselor to help you decide, or have your parent call the PREP office and an administrator will take care of the situation.

In case of any situation not mentioned above, the communication procedure that must be followed between the students and TexPREP staff is:

1. Program Assistant
2. Site Director
3. TexPREP Central Office staff
4. TexPREP Director

CLOSING DAY CEREMONY

The last day of the TexPREP program is the Closing Day Ceremony. All students who have successfully completed the program **must** attend. Parents/guardians, family and friends are invited to attend the ceremony and the students transcript will be given, at this time.

In addition to the information provided to you in this handbook, there are other things you, as a participant, must remember. You were accepted into this program on the premise that you are the best of the best and have earned your way. As such, we will treat you with respect and foster the development of your potential and skills. In return, we expect you to be respectful and courteous with all TexPREP staff members and classmates and to make a commitment to study and learn.

This handbook is provided for your information and use while at TexPREP. It is intended to serve as a guide for you and your parents/guardians throughout the program. Have a great summer and learn, discover, grow and, above all, enjoy your TexPREP experience!

PROGRAM LEARNING GOALS

Over the four summers of TexPREP, students will take a series of classes. The foundation of these is mathematical logic and reasoning; this includes an intentional and consistent emphasis on utilization and problem solving. Specific course content is enhanced by experiences designed to promote a clear understanding of how mathematical concepts and procedures are applied, particularly in the fields of science, technology, and engineering. Integration of course material is formally built into the program through special events and projects. These challenge the students' critical and divergent thinking skills and allow for the innovative application of mathematical ideas. In addition, guest speakers from a variety of career fields in STEM discuss how mathematical, science and engineering concepts are actually utilized within their professions. To summarize, the emphasis throughout TexPREP is on developing mathematical thinking ability, as well as an understanding of its usefulness and significance.

Essential Knowledge and Skills:

TexPREP I (Year 1)

(a) General requirements. This course is recommended for students in Grades 9-10. Students shall be awarded one credit for successful completion of this course.

(b) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Science, Technology, Engineering, and Mathematics (STEM) Career Cluster focuses on planning, managing, and providing scientific research and professional and technical services, including laboratory and testing services, and research and development services.

(3) TexPREP I coursework includes Logic and Its Applications to Mathematics, Engineering Foundations, Topics in Problem Solving, Research and Study, and College and Career Awareness seminar components. Systems thinking/system dynamics is integrated throughout the curriculum. Students will use a variety of computer hardware and software to complete assignments, projects, and develop coding skills. Students will work collaboratively during inquiry-, problem-, project- and/or challenge-based educational experiences. Oral and written communication skills in STEM are emphasized.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(c) Knowledge and skills.

(1) STEM Process Standards. The student engages in inquiry-, problem-, project- and/or challenge-based educational experiences to master content. The student is expected to:

(A) collaborate and include the ideas of others to explain or justify the complexities of an issue or problem;

(B) create timelines, organize ideas and document findings, such as with the use of an engineering journal;

(C) accept constructive criticism and revise explanation of views and solutions when valid evidence warrants;

(D) self-monitor learning needs and seek assistance when necessary; and

(E) communicate and share new and innovative solutions verbally, in writing, and using multiple media outlets.

(2) STEM Process Standards. The student critically adapts to challenges by systematically applying an engineering design process. The student is expected to:

(A) apply a problem solving model as a method of inquiry and application;

(B) investigate problem scenarios, identify problems or constraints, and provide solutions;

(C) develop and apply multiple strategies to solve problems;

(D) design and build test models or prototypes including the use of technology;

(E) verify and interpret results of simulations and make revisions or adjustments as needed.

(3) STEM Process Standards. The student justifies engineering principles by communicating mathematical and scientific reasoning and problem solving. The student is expected to:

(A) gather evidence and data systematically to support arguments, findings or lines of reasoning;

(B) apply mathematics and scientific principles to problems, including numerical calculations, simulations, and computer programming;

(C) construct well-reasoned arguments to explain phenomena, validate conjectures, or support positions;

(D) consider arguments and conclusions of self and others;

(E) support or modify claims, with evidence, based on the results of an inquiry; and

(F) evaluate sources for quality of content, validity, credibility, and relevance.

(4) STEM Process Standards. The student researches and exhibits employability skills as required by STEM business and industry. The student is expected to:

(A) demonstrate verbal, nonverbal, written, and electronic communication skills that provide clarity to an audience; and

(B) research a variety of STEM professions and describe the

pathway, including post-secondary education opportunities, that lead to a profession;

(C) establish education and career goals using self-awareness of interests and talents and research of educational and career information;

(D) explain and apply ethics and standards of professionalism when working alone and when working collaborating with others; and

(E) demonstrate productive work habits and attitudes when working alone and when collaborating with others.

(5) Logic and Its Applications to Mathematics. The student explores the applications of formal logic to mathematics. The student is expected to:

(A) develop and use clear and precise definitions for mathematical terms and expressions;

(B) distinguish between different types of sentences such as statements, exclamations, commands, and interrogatives;

(C) translate compound statements, arguments, and quantified statements from sentence form to appropriate symbolic notation and vice-versa;

(D) interpret the truthfulness and falsehood of compound statements, including inverse, converse, contrapositive, and bi-conditional statements;

(E) construct proofs using truth tables to prove two statements are logically equivalent;

(F) construct proofs, using truth tables and two-column proofs, to prove the validity of arguments involving traditional statements or quantified statements;

(G) apply models of classic arguments such as Modus Ponens, Modus Tollens, and Hypothetical Syllogism to prove the validity of arguments;

(H) apply concepts of set theory including sets, subsets, unions, intersections, and complements;

(I) correlate the set concepts of complement, union, intersection, and

set subtraction to the logical concepts of negation, disjunction, conjunction, and conditionals; and

(J) apply set counting techniques to determine the cardinality of sets such as negations, disjunctions, conjunctions, and conditionals using Venn diagrams.

(6) Engineering Foundations. The student uses their math, science, technology, and systems thinking skills to solve engineering problems. The student is expected to:

(A) describe the characteristics of a system, including the systems' parts, how they are connected, the behavior of a system, and the implicit/explicit goal(s) of the system;

(B) develop problem statements using a systems thinking approach;

(C) illustrate technical drawings for assembly and building instructions;

(D) apply Boolean Algebra and switching networks in a design task;

(E) discuss various topics relating to electricity and magnetism, including Coulomb's Law, electric fields, potential, capacitance, current, resistance, electromotive force, direct current circuit, and magnetic fields;

(F) design and construct electric circuit elements connected in both series and parallel combinations; and

(G) calculate current, potential difference, resistance, and power for the electric circuit elements.

(7) Topics in Problem Solving. The student establishes an understanding of systems thinking terminology, concepts, processes, methods, language and tools. The student is expected to:

(A) draw conclusions, or challenge the conclusions, of others applying the systems thinking tool, Ladder of Inference;

(B) collect evidence to support interpretation of system behavior;

(C) graph relationships, interpreting the rate of change of the line

that models that relationship;

(D) identify functions using sets of ordered pairs, tables, mappings and graphs;

(E) determine whether relations represented verbally, tabularly, graphically and symbolically define a function;

(F) distinguish between proportional and non-proportional situations using tables, graphs, and equations;

(G) determine the domain and range of functions in real-world situations; and

(H) describe and model solutions using systems thinking tools including behavior over time graphs, connection circles, causal loop diagrams, and stock/flow maps.

TexPREP II (Year 2)

(a) General requirements. This course is recommended for students in Grades 9-11. Recommended prerequisite: TexPREP I. Students shall be awarded one credit for successful completion of this course.

(b) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Science, Technology, Engineering, and Mathematics (STEM) Career Cluster focuses on planning, managing, and providing scientific research and professional and technical services, including laboratory and testing services, and research and development services.

(3) TexPREP I coursework includes Logic and Its Applications to Mathematics, Engineering Foundations, Topics in Problem Solving, Research and Study, and College and Career Awareness seminar components. Systems thinking/system dynamics is integrated throughout the curriculum. Students will use a variety of computer hardware and software to complete assignments, projects, and develop coding skills. Students will work collaboratively during inquiry-, problem-, project- and/or challenge-based educational experiences. Oral and written communication skills in STEM

are emphasized.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(c) Knowledge and skills.

(1) STEM Process Standards. The student engages in inquiry-, problem-, project- and/or challenge-based educational experiences to master content. The student is expected to:

(A) collaborate and include the ideas of others to explain or justify the complexities of an issue or problem;

(B) create timelines, organize ideas and document findings, such as with the use of an engineering journal;

(C) accept constructive criticism and revise explanation of views and solutions when valid evidence warrants;

(D) self-monitor learning needs and seek assistance when necessary; and

(E) communicate and share new and innovative solutions verbally, in writing, and using multiple media outlets.

(2) STEM Process Standards. The student critically adapts to challenges by systematically applying an engineering design process. The student is expected to:

(A) apply a problem solving model as a method of inquiry and application;

(B) investigate problem scenarios, identify problems or constraints, and provide solutions;

(C) develop and apply multiple strategies to solve problems;

(D) design and build test models or prototypes including the use of technology;

(E) verify and interpret results of simulations and make revisions or adjustments as needed.

(3) STEM Process Standards. The student justifies engineering principles by communicating mathematical and scientific reasoning and problem solving. The student is expected to:

(A) gather evidence and data systematically to support arguments, findings or lines of reasoning;

(B) apply mathematics and scientific principles to problems, including numerical calculations, simulations, and computer programming;

(C) construct well-reasoned arguments to explain phenomena, validate conjectures, or support positions;

(D) consider arguments and conclusions of self and others;

(E) support or modify claims, with evidence, based on the results of an inquiry; and

(F) evaluate sources for quality of content, validity, credibility, and relevance.

(4) STEM Process Standards. The student researches and exhibits employability skills as required by STEM business and industry. The student is expected to:

(A) demonstrate verbal, nonverbal, written, and electronic communication skills that provide clarity to an audience; and

(B) research a variety of STEM professions and describe the pathway, including post-secondary education opportunities, that lead to a profession;

(C) establish education and career goals using self-awareness of interests and talents and research of educational and career information;

(D) explain and apply ethics and standards of professionalism when working alone and when working collaborating with others; and

(E) demonstrate productive work habits and attitudes when working alone and when collaborating with others.

(5) Algebraic Structures**.** The student explores abstract algebra. The student is expected to:

(A) classify and categorize numbers into sets such as natural numbers, whole numbers, integers, rational numbers, real numbers, and congruence classes;

(B) apply properties of union, intersection, and complements of sets to prove relationships between sets;

(C) use modulo arithmetic in determining membership in congruence classes;

(D) evaluate and solve expressions and equations involving non-traditional mathematical operations, such as $a \Delta b = 2a - 3b$;

(E) extend the properties of closure, commutativity, associativity, identity, and inverse to non-traditional mathematical operations, such as identifying groups or rings;

(F) represent numerical systems in multiple forms such as functionally, graphically, tabularly, and algebraically; and

(G) experiment with non-Abelian number systems such as dihedral groups and matrix multiplication, to determine which properties are shared with more traditional number systems.

(6) Engineering Physics. The student explores applied physics with a strong emphasis on math and engineering fundamentals with the use of simulations based on system dynamics. The student is expected to:

(A) apply knowledge of mathematics, science, engineering, and systems thinking to design and conduct experiments and analyze and interpret data;

(B) design a system or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;

(C) generate and interpret graphs and charts describing different types of motion, including the use of real-time technology;

(D) describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, average velocity, instantaneous velocity, and acceleration;

(E) analyze and describe accelerated motion in two dimensions using equations, including projectile and circular examples;

(F) calculate the effect of forces on objects, including the law of inertia, the relationship between force and acceleration, and the nature of force pairs between objects;

(G) develop and interpret free-body force diagrams; and

(H) identify and describe motion relative to different frames of reference.

(7) Topics in Problem Solving. The student experiences problem solving as a method of inquiry and application. The student expands their understanding of systems thinking/system dynamics terminology, theories, processes, methods, language and tools. The student is expected to:

(A) test and verify solutions using systems thinking tools including behavior over time graphs, connection circles, causal loop diagrams, and stock/flow maps;

(B) illustrate and describe the relationship between events, patterns and system behavior using an iceberg model;

(C) use existing system dynamics' models for prediction and analysis of 'what if' scenarios;

(D) determine reasonable domain and range values for real-world situations, both continuous and discrete;

(E) write equations given a table of values, a graph, and a verbal description;

(F) write systems of equations of equations given a table of values, a graph, and a verbal description;

(G) solve equations, including the use of the distributive property and where variables are included on both sides; and

(H) evaluate functions, including those expressed in function notation, given one or more elements in their domains.

TexPREP III (Year 3)

(a) General requirements. This course is recommended for students in Grades 9-12. Recommended prerequisite: TexPREP II. Students shall be awarded one credit for successful completion of this course.

(b) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Science, Technology, Engineering, and Mathematics (STEM) Career

Cluster focuses on planning, managing, and providing scientific research and professional and technical services, including laboratory and testing services, and research and development services.

(3) TexPREP I coursework includes Logic and Its Applications to Mathematics, Engineering Foundations, Topics in Problem Solving, Research and Study, and College and Career Awareness seminar components. Systems thinking/system dynamics is integrated throughout the curriculum. Students will use a variety of computer hardware and software to complete assignments, projects, and develop coding skills. Students will work collaboratively during inquiry-, problem-, project- and/or challenge-based educational experiences. Oral and written communication skills in STEM are emphasized.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(c) Knowledge and skills.

(1) STEM Process Standards. The student engages in inquiry-, problem-, project- and/or challenge-based educational experiences to master content. The student is expected to:

(A) collaborate and include the ideas of others to explain or justify the complexities of an issue or problem;

(B) create timelines, organize ideas and document findings, such as with the use of an engineering journal;

(C) accept constructive criticism and revise explanation of views and solutions when valid evidence warrants;

(D) self-monitor learning needs and seek assistance when necessary; and

(E) communicate and share new and innovative solutions verbally, in writing, and using multiple media outlets.

(2) STEM Process Standards. The student critically adapts to challenges by systematically applying an engineering design process. The student is expected to:

(A) apply a problem solving model as a method of inquiry and application;

(B) investigate problem scenarios, identify problems or constraints,

and provide solutions;

(C) develop and apply multiple strategies to solve problems;

(D) design and build test models or prototypes including the use of technology; and

(E) verify and interpret results of simulations and make revisions or adjustments as needed.

(3) STEM Process Standards. The student justifies engineering principles by communicating mathematical and scientific reasoning and problem solving. The student is expected to:

(A) gather evidence and data systematically to support arguments, findings or lines of reasoning;

(B) apply mathematics and scientific principles to problems, including numerical calculations, simulations, and computer programming;

(C) construct well-reasoned arguments to explain phenomena, validate conjectures, or support positions;

(D) consider arguments and conclusions of self and others;

(E) support or modify claims, with evidence, based on the results of an inquiry; and

(F) evaluate sources for quality of content, validity, credibility, and relevance.

(4) STEM Process Standards. The student researches and exhibits employability skills as required by STEM business and industry. The student is expected to:

(A) demonstrate verbal, nonverbal, written, and electronic communication skills that provide clarity to an audience; and

(B) research a variety of STEM professions and describe the pathway, including post-secondary education opportunities, that lead to a profession;

(C) establish education and career goals using self-awareness of interests and talents and research of educational and career information;

(D) explain and apply ethics and standards of professionalism when working alone and when working collaborating with others; and

(E) demonstrate productive work habits and attitudes when working alone and when collaborating with others.

(5) Probability and Statistics. The student explores probability and statistics concepts, models, methodology, and applications. The student is expected to:

(A) collect, organize, and evaluate data;

(B) apply basic probability theory, including counting procedures, addition rule, multiplication rule, and independence;

(C) demonstrate knowledge of probability models, including binomial, Poisson, exponential, and normal;

(D) demonstrate knowledge of descriptive statistics, including tables and charts, measures of center, and measures of spread;

(E) demonstrate knowledge of analytical statistics, including confidence intervals for means and proportions, tests of hypothesis for means and proportions, and simple regression;

(F) construct and analyze arguments based on data analysis, using logic, reasoning, and problem-solving techniques; and

(G) sort, analyze, and interpret numerical data using statistical software.

(6) STEM Technical Writing. The student practices the elements of engineering and scientific writing. The student is expected to:

(A) use informal, standard, and technical language appropriately;

(B) organize ideas in writing to ensure coherence, logical progression, and support for ideas;

(C) collect, analyze, document, and report research clearly, concisely, logically, and ethically;

(D) analyze data from research; incorporate it into assigned writing clearly, concisely, and logically; and attribute the source with proper citation as determined by the American Psychological Association (APA) documentation manual, consistent with STEM fields of study;

(E) apply technical information and knowledge in practical documents for a variety of situations such as appealing to authority, to the original research data, and to logic;

(F) produce clear, persuasive, and efficient technical reports using word processing software and graphic techniques; and

(G) report results of statistical studies to a particular audience, including selecting an appropriate presentation format, creating graphical data displays, and interpreting results in terms of the question studied.

(7) Topics in Problem Solving. The student experiences problem solving as a method of inquiry and application. The student further expands their understanding of systems thinking/system dynamics modeling, theories, processes, methods, language and tools. The student is expected to:

(A) prepare and draft relationships between events, patterns and system behavior using an iceberg model;

(B) duplicate an existing system dynamics model for verification of output, such as the behavior of the system.

(C) determine and analyze the effects on the graphs of parent functions for specified values or terms such as *a*, *b*, *c*, and *d*;

(D) write and represent the domain and range of functions in interval notation, inequalities and set notation;

(E) solve, algebraically, systems of equations in two variables; and

(F) describe connections between algebra and geometry and use one- and two-dimensional coordinate systems to verify conjectures.

TexPREP IV (Year 4)

(a) General requirements. This course is recommended for students in Grades 9-12. Recommended prerequisite: TexPREP III. Students shall be awarded one credit for successful completion of this course.

(b) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or

emerging professions.

(2) The Science, Technology, Engineering, and Mathematics (STEM) Career Cluster focuses on planning, managing, and providing scientific research and professional and technical services, including laboratory and testing services, and research and development services.

(3) TexPREP I coursework includes Logic and Its Applications to Mathematics, Engineering Foundations, Topics in Problem Solving, Research and Study, and College and Career Awareness seminar components. Systems thinking/system dynamics is integrated throughout the curriculum. Students will use a variety of computer hardware and software to complete assignments, projects, and develop coding skills. Students will work collaboratively during inquiry-, problem-, project- and/or challenge-based educational experiences. Oral and written communication skills in STEM are emphasized.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(a) Knowledge and skills.

(1) STEM Process Standards. The student engages in inquiry-, problem-, project- and/or challenge-based educational experiences to master content. The student is expected to:

(A) collaborate and include the ideas of others to explain or justify the complexities of an issue or problem;

(B) create timelines, organize ideas and document findings, such as with the use of an engineering journal;

(C) accept constructive criticism and revise explanation of views and solutions when valid evidence warrants;

(D) self-monitor learning needs and seek assistance when necessary; and

(E) communicate and share new and innovative solutions verbally, in writing, and using multiple media outlets.

(2) STEM Process Standards. The student critically adapts to challenges by systematically applying an engineering design process. The student is expected to:

(A) apply a problem solving model as a method of inquiry and application;

(B) investigate problem scenarios, identify problems or constraints, and provide solutions;

(C) develop and apply multiple strategies to solve problems;

(D) design and build test models or prototypes including the use of technology;

(E) verify and interpret results of simulations and make revisions or adjustments as needed.

(3) STEM Process Standards. The student justifies engineering principles by communicating mathematical and scientific reasoning and problem solving. The student is expected to:

(A) gather evidence and data systematically to support arguments, findings or lines of reasoning;

(B) apply mathematics and scientific principles to problems, including numerical calculations, simulations, and computer programming;

(C) construct well-reasoned arguments to explain phenomena, validate conjectures, or support positions;

(D) consider arguments and conclusions of self and others;

(E) support or modify claims, with evidence, based on the results of an inquiry; and

(F) evaluate sources for quality of content, validity, credibility, and relevance.

(4) STEM Process Standards. The student researches and exhibits employability skills as required by STEM business and industry. The student is expected to:

(A) demonstrate verbal, nonverbal, written, and electronic communication skills that provide clarity to an audience; and

(B) research a variety of STEM professions and describe the pathway, including post-secondary education opportunities, that lead to a profession;

(C) establish education and career goals using self-awareness of interests and talents and research of educational and career information;

(D) explain and apply ethics and standards of professionalism when working alone and when working collaborating with others; and

(E) demonstrate productive work habits and attitudes when working alone and when collaborating with others.

(5) Computer Science. The student explores the foundational concepts of computer science with a focus on creative problem solving, real-world applications, and coding. The student is expected to:

(A) develop and use clear and precise definitions of computer concepts, terms and expressions, including basic hardware, software, and system components;

(B) describe the history and evolution of computers and relate these to the capabilities and applications of programming;

(C) demonstrate skills in an object-oriented language such as Python, Java, C++, C#,;

(D) write a computer program to solve a specified problem;

(E) design and create simple graphics program;

(F) employ appropriate mathematical and logical concepts in programming;

(G) apply the concepts of input, Boolean logic, and program repetition;

(H) develop an abstraction when writing a program;

(I) develop an algorithm for implementation in a program;

(J) write simple code using variables to output and calculate simple arithmetic operations;

(K) apply the concepts of creating and using functions, as well as generating random lists and values; and

(L) analyze the correctness, usability, functionality, and suitability of computational artifacts.

(6) STEM Capstone. The student applies critical thinking, problem-solving, and reasoning skills while investigating an advanced discipline-specific STEM topic such as cybersecurity, nanotechnology, computer-aided design (CAD), hydrology, bioscience, etc. The student synthesizes the teaching and learning from TexPREP I-III courses to solve real-world problems related to the course and applying a systems thinking/system dynamics problem solving approach as part of a team. The STEM Capstone course serves as a

culminating demonstration of what a student has learned in TexPREP. The student is expected to:

(A) develop and use advanced technical knowledge, concepts, and skills;

(B) interact and collaborate with peers, researchers, engineers, mathematicians, or technologists to complete a research project;

(C) conduct technical research related to a real-world problem;

(D) analyze elements of a problem to synthesize creative and innovative solutions;

(E) compare and contrast alternative solutions using a variety of problem-solving and critical-thinking skills;

(F) acquire, manipulate, and analyze data using equipment and technology;

(G) analyze and synthesize information to solve a problem;

(H) analyze data collected in charts, tables, and graphs;

(I) analyze data using statistical methods to recognize patterns, trends, and relationships;

(J) synthesize valid conclusions from qualitative and quantitative data;

(K) communicate conclusions clearly and concisely to an audience of professionals or stakeholders; and

(L) create a portfolio of artifacts related to the STEM Capstone experience.

(7) Topics in Problem Solving. The student experiences problem solving as a method of inquiry and application. The student justifies their understanding of systems thinking/system dynamics terminology, theories, processes, methods, language and tools. The student is expected to:

(A) propose solutions to a problem with the strongest leverage including identifying non-intended consequences, etc.;

(B) create a system dynamics model;

(C) use the composition of two functions to model and solve real-world problems;

(D) compare and contrast the key attributes of functions and their inverses;

(E) verify that two functions are inverses of each other algebraically, tabularly and graphically;

(F) use trigonometry in mathematical and real-world problems; and

(G) describe the relationships between secant and tangent lines and rate of change and apply the relationship in a given context; and

(H) demonstrate, describe and recognize ways in which limits effect functions.

Component Grade Breakdown

Each component is worth a certain percentage to the final grade. The component breakdown consists of the following:

Year 1
Logic - 50%
Engineering - 20%
Problem Solving - 20%
Daily Journal - 10%

Year 2
Algebraic Structures - 40%
Problem Solving - 25%
Physics - 25%
Daily Journal - 10%

Year 3
Probability and Statistics - 30%
Problem Solving - 30%
Technical Writing - 30%
Daily Journal - 10%

Year 4
Advance Science & Engineering (Track=Nanotechnology/ Water Science/Cybersecurity) - 30%
Computer Science - 30%
Problem Solving - 30%
Daily Journal - 10%

GRADING SCALE

100.00 - 99.00	A+ (Outstanding)
98.99 - 98.00	A+ (Honors)
97.99 - 93.00	A
92.99 - 85.00	B
84.99 - 75.00	C
74.99 - 69.50	D
BELOW 69.50	F

Any student with a grade of 69.5 or greater has successfully completed the program.

TEST TAKING TIPS

The following are suggestions for test taking strategies:

1. Be sure that you have all required testing materials for the exam. (Showing up for an exam late or without a pencil is a sure way to increase your stress.)

2. **Read all directions carefully**. Notice key words in the directions that indicate how to record your answers.

3. Use your time wisely. Do a quick preview of the test to determine the type and number of questions to be answered. Notice where you will start on the test. Check yourself at 15 minute intervals to see if you are progressing at an acceptable rate.

4. You may have problems remembering answers to questions from time to time. If you find yourself blocking, move on to the next question.

5. Ask for help in interpreting test questions that you do not understand.

6. Be aware of any negative statements you are telling yourself about the test. Such statements as, "I'm failing, I didn't study for this, or this test is too hard for me," increases anxiety.

7. Worry only about yourself. Do not be concerned with what other students are doing. (This is another sure way to increase anxiety by telling yourself that <u>you</u> are the <u>only</u> one having trouble.)

8. As a general rule, answer the easy questions first.

TESTS INVOLVING PROBLEM SOLVING

1. Use the technique of budgeting your time.

2. Work the easiest problems first.

3. Write down the formulas, equations, and rules before you begin working on the test.

4. Check your answers when time permits. Check for addition and multiplication errors by reversing numbers whenever possible.

5. Show all your work; label your answers.

OBJECTIVE EXAMS

1. Answer the questions in order.

2. Put check marks by the questions that are doubtful, and come back to them later.

3. Read the questions carefully. Be careful of questions containing negative words such as "not, no, least," etc. (This could cause you to misinterpret the question.)

5. Pay attention to wording such as, "all, most, some, none; always, usually, seldom, never; best, worst; highest, lowest; smallest, largest." (It might make a difference in which answer selection you make.)

5. Watch for limiting phrases in true-false statements. Names, dates, places, are often used as the key to make a statement false.

6. In multiple choice questions, look for grammatical inconsistency between the stem and response. In most cases, the alternative is not correct if you find an inconsistency.

7. Change your answers only if you are sure you made an error. Often your first intuition is correct.

ESSAY EXAMS

1. Read all questions first. Write down the key points that occur to you as you read the questions.

2. Plan the amount of time you can spend on each question based on the difficulty and the amount of points to be received.

3. Answer the easiest questions first.

4. Underline key words in the questions that give you a clue about how to answer. Words such as, "define, compare, contrast, and explain," require different ways of answering.

5. Answer all questions. If you don't know the precise answer, try to write a closely related one.

6. Be neat and legible.

7. Leave enough space between answers to be able to add information you may recall while working on other items.

ACKNOWLEDGEMENT OF RECEIPT OF THE STUDENT AND PARENT HANDBOOK

2019 SAN ANTONIO TexPREP

In our continued efforts to be as efficient as possible, the San Antonio TexPREP website will now be the primary source for access to the Student and Parent Handbook. Families who do not have Internet Access or prefer a hard copy can receive one at their site campus on request. Please complete the requested information below and return to your site director.

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My student and I have been offered the option to receive a paper copy of the San Antonio TexPREP Student and Parent Handbook or to electronically access it at https://drive.google.com/file/d/1Wx4LVlY3KK7ocIIv2WBnnXcLGyhdE65S/view. I understand that the handbook contains information that my child and I may need during the summer.

I am/we are responsible for reading, understanding and abiding the rules, expectations, and other information contained in this publication. Furthermore, we acknowledge that we have read and understood the contents of the handbook and have had an opportunity to ask questions.

I have chosen to:

____ Accept responsibility to access the *Student and Parent Handbook* by visiting the website at http://p20.utsa.edu/programs/prep/ on **Monday, June 17, 2019.**

____ Receive a paper copy of the *Student and Parent Handbook* on the first day of the program **Monday, June 17, 2019**.

Participant's Name (printed)	PREP Site
Participant's Signature	Date
Parent's/Guardian's Signature	Date