AUSTIN PRE-FRESHMAN ENGINEERING PROGRAM
2017

Student and Parent Handbook

Contact Information
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Austin Pre-Freshman Engineering Program (AusPrEP) 2017

SITE & PROGRAM INFORMATION

CAMPUS: Huston-Tillotson University (HT) located at 900 Chicon Street Austin, TX 78702

DATES: **AusPrEP:** June 12 to July 27, 2017 **Pre-Algebra Institute:** July 5 to July 27, 2017

HOURS: AusPREP will be held Monday through Friday from 8:30 a.m. to 3:00 p.m.
Pre-Algebra Institute will be held Monday through Friday from 8:30 a.m. to 12:00 p.m.

FACILITIES

All program activities, except for field trips, will be at HT. AusPrEP staff will be available to help with research, projects and homework, if needed. You may be able to use the library and cafeteria. You will hear about other campus privileges at the Parent Orientation and on the first day of classes.

COURSE FOR PRE-ALGEBRA INSTITUTE: (Incoming 6th graders only)

Introduction to Algebra: Studies to improve skills in integers, fractions, decimals, ratios, proportions, percentages averages, substituting values, setting up equations, polynomial basics and factoring, linear equations, and exponents.

COURSES FOR FIRST YEAR AUSPREP

Logic and Its Application to Mathematics: Compound statements, truth tables, elementary set theory, Boolean algebra and switching networks.

Introduction to Engineering: Lecture/laboratory class with the following topics: the engineering profession, measurements, simple mechanics, work-energy and engineering design; in-class and laboratory demonstrations of engineering principles; and team designs of bridges, towers, and gliders.

COURSES FOR SECOND YEAR AUSPREP

Introduction to Physics: The student will learn to apply principles of Physics in the laboratory using friction linear track and resistors in series and parallel. A demonstration of mechanics, units and physical quantities, equilibrium of a particle, motion in a strait line, Coulomb's and Ampere's Law.

Algebraic Structures: This course gives a basic knowledge of groups, rings, and fields using system of integers and rational numbers as models, the derivation of algebraic properties of these systems, set theory, and properties of abstract mathematical systems.

COURSES FOR THIRD YEAR AUSPREP

Probability and Statistics: Students will gain an understanding of basic probability theory and models including the binomial, hyper geometric, Poisson, exponential, and normal models. They will also learn how to generate statistical tables and charts as well as measure center and spread for distributions.

Introduction to Computer Science: Introduction to computers; explanation of basic hardware and software applications; solving problems by developing algorithms and using flow charting; use

of an object-oriented programming language.

ALL YEARS

Topics in Problem Solving:
Numerous and varied experiences with problem solving as a method of inquiry and application so that students can use problem solving approaches to investigate and understand mathematical content, formulate problems, develop and apply a variety of strategies to solve problems, verify and interpret results, generalize solutions and strategies to new problem situations, and acquire confidence in using mathematics meaningfully.

Writing: This class concentrates on the writing skills applicable to engineering and science fields. Students will learn to appeal to authority, original research, and logic. This course also reinforces basic writing skills such as purpose and audience, organization and development, revision, editing, style, grammar, and mechanics. Students will also learn to produce clear, persuasive, and efficient technical reports using word processor software and graphics.

Research and Study:
Work on assignments and projects. Consultations/tutoring with instructors and program assistant mentors.

Career Awareness:
Invited speakers from local and state high technology industries will discuss professional engineering and science opportunities, their own work, and a biography of their professional development; special technical presentations; some speakers will counsel on such topics as resume preparation, college preparatory expectations, college financial aid, test taking techniques and leadership skills.

PREP GRADING SCALE

A+	100.00 – 98(Outstanding)	C	84.99 - 75.00
A	97.99- 93.00	D	74.99 – 69.50
B	92.99 – 85.00	F	BELOW 69.49

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

Final grades will be computed using the following weighting:

First Year	Second Year	Third Year
Logic = 50%	Algebraic Structures = 40%	Probability & Statistics = 25%
Problem Solving = 20%	Problem Solving = 25%	Problem Solving = 25%
Engineering = 20%	Introduction to Physics = 25%	Computer Science = 25%
Journal I = 10%	Journal II = 10%	Technical Writing = 25%

PARENT ORIENTATION
A parent orientation meeting will be held on the HT campus in Dickey-Lawless, Room 200 on **May 16, 2016 from 4:00-6:00 p.m.** If you cannot make this session, contact the program director at 512.505.6479 before May 16th to make other arrangements.

TRANSPORTATION
Participants are responsible for their own transportation to and from AusPrEP and Pre-Algebra.

If you have any questions or concerns, please email ausprep@htu.edu or call 512.505.6479

AusPrEP Schedule

8:00-8:25am — Arrival

8:30-9:25am — Class Period 1

9:30-10:25am — Class Period 2

10:30-11:25am — Career Awareness Speakers

11:30-12:00pm — Lunch Y1

12:05-12:55pm — Class Period 3

11:30-12:20pm — Class Period 3

12:25-12:55pm — Lunch Y2, Y3

1:00-1:55pm — Class Period 4

2:00-2:55pm — Research & Study Period

3:00-3:15pm — Dismissal

Pre-Algebra Schedule

8:00-8:25am — Arrival

8:30-10:25am — Class Period

10:30-11:25am — Career Awareness Speakers

11:30-12:00pm — Lunch

12:05-12:30pm — Dismissal

AusPrEP Map

Drop-off and pick-up location is on the north side of the Student Union. Enter and exit out of the Chicon Street gate.

All AusPrEP programming will take place in Dickey-Lawless building. Lunch is held in the Student Union.

AusPrEP POLICIES & REGULATIONS

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 absent, tardy, or requesting an early dismissal, the parent or guardian must notify the assigned AusPrEP site by email to the Site Director or calling the AusPrEP 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 AusPrEP program. Students with **5 tardies** and/or **early dismissals, or a combination of absences/tardiness/early dismissals equivalent to 5 days of instruction** may be asked to resign from the program.

3. Excused absences are approved by the Site Director. **A maximum of five excused absences is allowed for the AusPrEP program, and a maximum of three for the Pre-Algebra Institute**. On the sixth, or fourth, absence, the student will be dismissed. Students are reminded 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. Students must be picked up on-time at the program close daily. **The pick-up windows are 3:00-3:15pm daily for AusPrEP and 12:05-12:30pm for Pre-Algebra.** AusPrEP staff must know by 12:00pm if a student will be carpooling with another participant. Students will not be allowed to leave with unapproved carpool arrangement. A **maximum of three tardy pick-ups** will be allowed, and students will be dismissed from the program on the fourth occurrence.

5. The dress code must be strictly adhered to. Students are to wear modest comfortable, appropriate clothing. Items of dress strictly prohibited are tank tops, inappropriate shorts, spandex clothing, slip dresses, sheer clothing, shirts with offensive sayings; caps are permitted only during special events held outside.

6. Students must attend the graduation ceremony to complete the AusPrEP program and receive a certificate for their time in AusPrEP. If absent within

the excused absences of five (5) 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.

7. Students should only bring classroom material and personal care items to campus. AusPrEP is not responsible for lost and damaged items. Cell phone use is at the discretion of the site staff.

8. Fireworks, guns or knives, or any other weapons are strictly prohibited and will result in dismissal from the program.

9. 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 AusPrEP hours. Any AusPrEP 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.

10. Food and drinks are not allowed in the lecture halls, labs or classrooms. Smoking, alcohol, chewing gum, and gambling are not permitted.

11. Unruly, unsafe or inappropriate behavior is grounds for dismissal.

12. Communication, including by social media, between minors and staff/counselors outside of official communications of the program for minors is prohibited.

13. Students are not allowed to use elevators, unless written documentation is provided from a doctor.

14. Site Director may have additional rules as needed.

MEDICATION

There are many legal issues involved in a student taking prescribed medication while at AusPrEP. 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 AusPrEP. 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 AusPrEP program Site Director. This details times, dosages, potential side effects, etc.

3. The parent/guardian must personally deliver the medication to the AusPrEP program Site Director.

4. AusPrEP 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 to allow for the parent/guardian to administer either non- prescription or prescription medication. Students are not allowed to carry non- prescription nor prescription medication while at AusPrEP.

FREQUENTLY ASKED QUESTIONS

What if ...

...you need to speak to a PREP administrator? Tell your PA.

...you are late to PREP? 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 to call your parents? Ask your PA.

...you will be absent? Refer to "Regulations."

...you lose or misplace your name tag/button? Tell your PA.

...anyone on campus exhibits behavior that is inappropriate or makes you feel uncomfortable? Find and tell any PREP 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 AusPrEP? Talk to your PA and the Site Director, or have your parent call the AusPrEP office (512.505.6479) 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 AusPrEP staff is to first speak to the Program Assistant and second to the Site Director.

PROGRAM LEARNING GOALS

AusPrEP is an intellectually demanding, mathematics-based, academic enrichment program for middle and high school students. Its program is presented in seven (7) week sessions over the course of four summers, for a total of twenty- eight weeks.

The intent of AusPrEP is to provide students who have demonstrated mathematical ability (through academic performance, participation in competitions and teacher/counselor recommendations) with the academic and intellectual competencies to succeed in high school, college preparation courses; in college programs in mathematics, science and engineering; and to facilitate their interest in and commitment to pursuing careers in mathematics, science and engineering. It is targeted toward, but not limited to, students who are members of minority groups or female, i.e., groups who have traditionally been underrepresented in the professions of mathematics, science and engineering.

The curriculum is designed to strengthen the students' ability to problem solve, reason, conjecture, and apply mathematical knowledge logically and systematically. It stresses the development of critical thinking, abstract reasoning, and systematic analysis. Through an integrated and hands-on approach, it demonstrates the application of mathematics to diverse disciplines, particularly to the fields of science, computer science, and engineering, and to a wide range of career opportunities. Students not only develop their basic mathematical skills and knowledge, but also learn to communicate and reason mathematically - both orally and in writing. In addition, through their experiences of success in a rigorous academic program, they learn that hard work, perseverance and commitment result in meaningful knowledge and pride in accomplishment.

Over the three-year period, students 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 engineering, computer science and science. 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 mathematics, science and engineering discuss how mathematical, science and engineering concepts are actually utilize within their professions. To summarize, the emphasis throughout is on developing mathematical thinking ability, as well as an understanding of its usefulness and significance.

The course curricula for AusPrEP was reviewed in depth in 1991 in order to ensure that it met the Curriculum and Evaluation Standards **developed by the National Council of Teachers of Mathematics. It specifically addressed the following learning goals:**

Logic and Its Applications to Mathematics (Year 1)

- Students will demonstrate the ability to understand and apply logical statements, compound statements (negation, conjunction, disjunction, conditional, and biconditional), logical equivalents, valid and invalid arguments, truth tables, rules of interference, paradoxes, elementary set theory (sets, subsets, union, intersection and complements, and properties of operations), Boolean Algebra (definition, examples, and properties), and switching networks (definition, examples, and switching statements).
- Students will demonstrate the ability to understand and utilize universal and existential quantifiers.
- Students will demonstrate knowledge of the basic concept of set theory.
- Students will demonstrate the ability to conjecture, and to test and build arguments.
- Students will demonstrate an understanding of the use of mathematics to symbolically represent ideas, relationships, and operations.
- Students will demonstrate the ability to communicate using the signs, symbols, and terminology of

mathematics.

- Students will demonstrate an increased capacity for both critical and divergent thinking, as well as inductive and deductive reasoning.
- Students will demonstrate an increased ability to analyze and communicate their thinking processes.

Introduction to Engineering (Year 1)

- Students will demonstrate knowledge of the history and philosophy of engineering, the engineering design process and mathematical tools, the use of computers in engineering, engineering ethics and standards of professionalism, and the job focus and also requirements for career preparation for various types of engineering fields.
- Students will demonstrate knowledge of basic engineering principles in the areas of work and energy, simple machines, light and optics, thermal science, and mechanics.
- Students will demonstrate the ability to apply engineering principles to team projects, i.e. airplane designs, security systems, egg drops, bridge design, solar reflectors, etc.
- Student will demonstrate knowledge of the relevance of distribution math and its link to engineering and study electrical engineering (middle school adaptation of the Infinity Project created by Texas Instruments and the SMU School of Engineering).
- Students will demonstrate the ability to apply the engineering design process and design a sound demixing device and describe techniques related to multi-channel surround sound.

Algebraic Structures (Year 2)

- Students will demonstrate knowledge of groups, rings and fields using the systems of integers and rational numbers as models, and the derivation of algebraic properties of these systems.
- Students will demonstrate knowledge of the basic concepts of set theory, operations involving sets, properties of abstract mathematical systems, and the use of deductive and inductive reasoning with proofs.
- Students will demonstrate the ability to represent situations and number patterns with tables, graphs, mathematical symbols and equations, and will be able to understand and communicate the relationships, patterns, and concepts.
- Students will apply algebraic concepts and procedures to problem solve.

Introduction to Physics (Year 2)

- Students will demonstrate knowledge of Mechanics: units and physical quantities, equilibrium of a particle, motion in a straight line, Newton's second law, motion in a plane, work and energy, inertia and momentum, circular motion, and equilibrium.
- Students will demonstrate knowledge of Electricity and Magnetism: Coulomb's Law, electric fields, potential, capacitance, current, resistance, electromotive force, direct current circuit, and magnetic fields.
- Students will demonstrate the ability to apply principles of physical science in the laboratory: friction linear air track, free-falling bodies, multiflash photography, the conical pendulum, capacitors in series and parallel, resistors in series and parallel, and Ampere's Law.

Introduction to Probability and Statistics (Year 3)

- Students will demonstrate an understanding of basic probability theory: counting procedures, addition rule, multiplication rule, and independence.
- Students will demonstrate knowledge of probability models: binomial, hypergeometric, Poisson,

exponential, and normal.

- Student will demonstrate knowledge of descriptive statistics: tables and charts, measures of center, and measures of spread.
- Students will demonstrate knowledge of analytical statistics: confidence intervals for means and proportions, tests of hypothesis for means and proportions, and simple regression.
- Students will be able to collect, organize and evaluate data.
- Students will develop the ability to analyze, conjecture, and build arguments based on data analysis, and using logic, reasoning and problem solving techniques.
- Students will develop the ability to sort, analyze, and interpret numerical data using statistical software.

Introduction to Technical Writing (Year 3)

- Students will demonstrate increased clarity and effectiveness in their writing skills as particularly applicable to the disciplines of engineering and science. This includes techniques such as appeal to authority, appeal to original research data and appeal to logic.
- Students will demonstrate increased skill in technical writing methods: invention, assessment of purpose and audience, organization and development, revision, editing, style, grammar, and mechanics.
- Students will demonstrate their ability to produce clear, persuasive and efficient technical reports using word processing software and graphic techniques.

Introduction to Computer Science (Year 3)

- Students will demonstrate a basic knowledge of the capabilities and application of computers; computer concepts and terms; basic hardware and software concepts; definitions of system components; computer architecture; networks and types of programming languages; computer security (i.e., spamming, viruses, worms, phishing, etc.) and social implications surrounding computers (i.e., copyright rules and ethical; use of computers).
- Students will demonstrate basic programming skills in an object-oriented language such as Java, C++, C#, etc.
- Students will develop the ability to utilize computer software to assist with sorting, analyzing and interpreting data.
- Students will recognize that mathematical concepts and data can be represented utilizing a variety of graphic and numerical forms.
- Students will develop the ability to utilize computer software to present material clearly and effectively through the use of graphics, tables, etc.
- Students will learn about basic web technology including the client-server model, navigation and web site organization. Students will create a web site using a web development tool such as Microsoft's Expression Web Development System and modify programs to generate dynamic, interactive web pages.

Topics in Problem Solving (All Years)

- Students will demonstrate knowledge of formal problem solving techniques, both heuristic and algorithmic, including looking for patterns, developing lists and tables, writing equations, simplification, utilization and evaluation of research.
- Students will demonstrate the ability to utilize problem solving techniques as a method of inquiry and application, specifically to investigate and understand mathematical content, formulate problems, construct, analyze and test hypothesis, gather evidence, verify and interpret results, draw

inferences, build arguments, and generalize solutions.

- Students will demonstrate the ability to generalize and extrapolate patterns of solutions and problem solving strategies.
- Students will demonstrate an understanding of how problem solving approaches, methods of investigating and reasoning can be applied to new situations and to multi-step, complex and non-routine problems.
- Students will demonstrate the application of problem solving techniques to specific mathematical concepts in algebra and geometry.
- Students will demonstrate an understanding of how problem solving and thinking can be represented, clarified, contrasted and/or consolidated through the use of mathematical symbols and language.
- Students will demonstrate an increased ability to reason mathematically, as well as increased flexibility in exploring mathematical solutions and ideas.
- Students will demonstrate knowledge of the importance of accurate documentation and clear, efficient, persuasive presentations.
- Students will demonstrate the ability to conduct library research, interviews, surveys, and field investigations, incorporating their problem solving and reasoning skills. Students will apply their course work to solving real world problems using an interdisciplinary approach in Year 4.

Career Opportunities Awareness (All Years)

- Students will demonstrate increased knowledge of the diversity of professions within the fields of mathematics, science, technology, and engineering.
- Students will demonstrate a basic understanding of the necessary steps, and the opportunities available to them, to pursue careers in mathematics, science, technology, and engineering.
- Students will demonstrate increased motivation to achieve academically in high school.
- Students will be able to explain the relationships between mathematics and the disciplines it serves (physical and life sciences, social sciences and humanities).
- Students will demonstrate understanding of the flexibility and usefulness of mathematics as applied to diverse aspects of everyday living.
- Students will demonstrate an understanding of the link between mathematics and continuous innovation in technology and computer science.
- Students will demonstrate knowledge of the college application process, as well as awareness of financial aid and scholarship opportunities.

Research and Study (All Years)

- Students will demonstrate self-awareness, organizational skills and initiative in planning, evaluating personal strengths and goals, and in completing projects and assignments including a personal journal.
- Students will develop a personal relationship with a Program Assistant Mentor, who will serve as role model, individual and small group tutor, and facilitator of personal growth and goal planning endeavors.

Field Trips (All Years)

- Students will gain hands-on experience and knowledge of the applications of science and mathematics in factories, business, entertainment centers and other environs.
- Students will gain a broader exposure and awareness of the impact of mathematics, science,

engineering and technology on their everyday lives.

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%
	Journal I – 10%
Year 2	Algebraic Structures – 40%
	Physics – 25%
	Problem Solving – 25%
	Journal II – 10%
Year 3	Probability and Statistics – 25%
	Computer Science – 25%
	Problem Solving – 25%
	Technical Writing – 25%

GRADE SCALE

Below is the scale used to calculate all final grades:

100.00 - 98.00	A+ (Outstanding)
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.)