College Preparatory Mathematics Course for High Schools

Course Code CP111200

July 30, 2024

Texas House Bill 5, Section 10

Region One Education Service Center

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Regional Approach

- Texas House Bill 5 requires Local Education Agency's to partner with Institutions of Higher Education to create locally developed college preparatory courses.
- In response, Region One ESC has partnered with RGV Focus, Local Institutions of Higher Education (IHE) and Local Education Agencies (LEAs) to support and facilitate the creation of College Prep courses for Mathematics and English.

The University of Texas Rio Grande Valley

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STC South Texas College

TSC

TSTC Texas State Technical College

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Regional Goal

- To collaboratively create two courses that provide an opportunity for students to demonstrate college readiness in Mathematics and/or English language arts while still in high school.
- Ensure that students will be successful in their credit bearing courses during their freshmen year in college.

College Preparatory Mathematics Courses

- More than 60 sections per year
- More than 2,000 students per year
- Many students pass the TSI test instead of while taking the course
- Student's passing the College Preparatory Mathematics course can get a 2-year waiver for the TSI Assessment requirements at participating Institutions of Higher Education (IHE)

TSI Waiver

- 2-year waiver for the TSI Assessment requirements at participating Institutions of Higher Education (IHE)
- This allows students to take entry level mathematics courses at participating IHE: College Algebra; Elementary Statistics; Contemporary Mathematics; Mathematics for Liberal Arts.
- The waiver is accepted at 2-year and 4-year IHE in Region One and Region Two.
- Student **must request** TSI waiver from college during registration or orientation (the waiver is not automatic!!!)

Memorandum of Understanding (signed by school districts)

- Successful completion of the course is defined as:
  - overall grade of 70 or higher:
  - The final assessment in part B must compose at least 30% of the course grade.
  - **Student work** is a required component of the coursework.
  - Passing grade on high school transcript with course code
    - "MATH A CP111200" Fall (part A) semester
    - "MATH B CP111200" Spring (part B) semester

Who should take this course ?

Target Students

- Students who have not demonstrated college readiness as defined by HB5
- Recommended for students who either did not take Algebra II or those who made an overall grade of less than 75 in Algebra II.

Pre-requisites

- Received credit for Algebra I and Geometry
- Met the passing standard on the Algebra I EOC (unless otherwise were not taken due to Covid-19 pandemic restrictions)

The course is a “last chance” to be College Ready before graduation. Students who are earlier in their high school programs have other opportunities and time.

Course Credit
for Mathematics

- The course is available for advanced mathematics credit under the Endorsement Graduation Plans.
- This must be approved by individual school districts.
- Even if student passes the TSI while taking this course, they should finish the course.

Region One is available to discuss this with your administrators if needed or use the HB5 information posted on the website.

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College Preparatory Mathematics Courses

- All course materials are free, assembled by a group of faculty from area high schools, colleges and universities (UTPA+UTB), maintained and administered by UTRGV (textbook and online assessment system)
- The course consists of a two-semester sequence:
  - Part A (fall, prerequisite to part B)
  - Part B (spring) (unless accelerated schedule)

High School Instructors!!

- Request online course shell for assignments (email Andras.Balogh@utrgv.edu)
  - Now: Part A (fall)
  - December/January: part B (spring) (or sooner if accelerated schedule)
- Manage the class:
  - Upload student class lists to the online course shell.
  - Make assignments available.
    - In-class work
    - Homework
    - Quizzes
    - Tests
  - Decides how grading will be calculated.
  - Record grades in high school gradebook.

Active Learning

- All higher education institutions in the RGV have developed college course designs that emphasize **Active Learning** and student work.
- Drawbacks of traditional, lecture-based instructions:
  - Lecture => student passively sits and maybe listens
  - Homework, exams => no help, no control, not much incentives, too late for corrections
- **Active Learning**
  - Students spend between 50% to 100% of their class time working problems rather than listening to lectures or watching one person work on problems.
  - Active learning is proving to be very effective, particularly for courses that cover material students have already seen.
  - Computer software provides an efficient method for delivering material to students, giving them immediate feedback on their work, and helping the instructor identify problems that need to be addressed in more detail.
  - Instructors may concentrate on topics and students showing a need for additional help.

College Preparatory Mathematics Course

- One course with parts A and B.
- Not the same, but similar to Algebra I and II
- More like Beginning Algebra and Intermediate Algebra at college level.
- Part A => Final exam => Part B => Final exam
- High school transcript with course code CP111200 or
    - Fall (part A) semester “MATH A CP111200”
    - Spring (part B) semester “MATH B CP111200”

Course Design (practice and mastery)

- Free Online Textbook: Tyler Wallace, Beginning and Intermediate Algebra
  - Web version of sections covered
  - PDF version
  - Instructional videos
- Free online system (WeBWorK) for Assignments/Quizzes/Exams
  - Online
  - Printable

Topics Covered in Part A

Chapter 0 Prealgebra
0.1 Integers
0.2 Fractions
0.3 Order of Operations
0.4 Properties of Algebra

Chapter 1 Solving Linear Equations
1.1 One Step Equations
1.2 Two-Step Equations
1.3 General Linear Equations
1.4 Solving with Fractions
1.5 Formulas

Chapter 2 Graphing
2.1 Points and Lines
2.2 Slope
2.3 Slope-Intercept Form
2.4 Point-Slope Form
2.5 Parallel and Perpendicular Lines

Chapter 3 Inequalities
3.1 Solve and Graph Inequalities
3.2 Compound Inequalities
3.3 Absolute Value Inequalities

Chapter 4 Systems of Equations
4.1 Graphing
4.2 Substitution
4.3 Addition/Elimination

Chapter 5 Polynomials
5.1 Exponent Properties
5.2 Negative Exponents
5.3 Scientific Notation
5.4 Introduction to Polynomials
5.5 Multiplying Polynomial
5.6 Multiply Special Products
5.7 Divide Polynomials

Chapter 6 Factoring
6.1 Greatest Common Factor
6.2 Grouping
6.3 Trinomials where $a = 1$
6.4 Trinomials where $a \neq 1$
6.5 Factoring Special Products
6.7 Solve by Factoring

Topics Covered in Part B

Chapter 4 Systems of Equations
4.1-4.3 Systems of Equations (review)
4.5 Value Problems (new)
4.6 Mixture Problems (new)
Chapter 5 Polynomials (review)
Chapter 6 Factoring (review)
6.1 - 6.5 Factoring (review)
6.6 Factoring Strategy
Chapter 7 Rational Expressions
7.1 Reduce Rational Expressions
7.2 Multiply and Divide
7.3 Least Common Denominators
7.4 Add and Subtract
7.5 Complex Fractions
7.6 Proportions
7.7 Solving Rational Equations
7.8 Dimensional Analysis
Chapter 8 Radicals
8.1 Square Roots
8.2 Higher Roots
8.3 Adding Radicals
8.4 Multiply and Divide Radicals
8.5 Rationalize Denominators
8.6 Rational Exponents
8.8 Complex Numbers
Chapter 9 Quadratics
9.1 Solving with Radicals
9.2 Solving with Exponents
9.3 Complete the Square
9.4 Quadratic Formula
9.5 Build Quadratics From Roots
9.6 Quadratic in Form
9.7 Quadratics - Rectangles
9.8 Quadratics - Teamwork
9.11 Quadratics - Graphs of Quadratics
Chapter 10 Functions
10.1 Function Notation
10.2 Operations on Functions
10.4 Exponential Functions
10.6 Compound Interest

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Alignment of Learning Outcomes/TEKS/CCRS

Math Learning Outcomes	TEKS	CCRS
Upon successful completion of Math Course A, students will:		
1. Identify and apply properties of real numbers, and perform accurate arithmetic operations with numbers in various formats and number systems.	6.1ABCDE, 6.2ABCE 7.1ABCDE, 7.2BDEF 8.1ABCDE, 8.2AB A.4, A.5A, A.11AB, A.12A 2A.2AB 2A.6C,2A.8B M.1ABC, M.5AB, M.6, M.7A, P.1D	IA1, IA2, IB1
2. Demonstrate an understanding of linear equations, inequalities, and graphs.	6.10A, 6.12A, 7.11A, 7.14A, 8.12C A.1D, A.2C, A.3ABCF, A.5C, A.6A, A.8B, A.11B G.1D 2A.1B, 2A.6B M.1B, M.2A, P.1	IXB1
3. Demonstrate the ability to perform basic operations on polynomials, and an understanding of algebraic operations.	7.5A, 8.3B A.10BCDE, A.3DFG, A.4AB, A.5A, A.7BC, A.8BC 2A.3AB	IIC1, IIC2
4. Solve word problems and application problems.	6.11AB, 6.13B, 7.13AB, 7.15B, 8.14ABCD, 8.16B A.2ABCDEFG, A.3BCE, A.4AC, A.5, A.6A, A.7C, A.8B, A.9, A.11AB G.3BCDE, G.5BCD, G.7C, G.8, G.9, G.10, G.11 2A.4A, 2A.9F, 2A.10B, 2A.11F, M.1AC, M.2CD, M.3A, M.5A,M.8C, P.2A, P.3	VIIIA1, VIIIA2, VIIIA3, VIIIA4, VIIIA5, VIIIB1, VIIIB2, VIIIC1, VIIIC2, VIIIC3, IXA3

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Alignment of Learning Outcomes/TEKS/CCRS

Math Learning Outcomes	TEKS	CCRS
Upon successful completion of Math Course B, students will:		
1. Simplify, factor, and manipulate algebraic expressions and equations.	8.2B, 8.5B, 8.16B A.4, A.5A, A.6D, A.10BCDE 2A.2, 2A.3AB	IIA1, IIB1
2. Solve algebraic equations: Linear, Quadratic, Rational, and Radical.	7.5A, 8.3B A.3DFG, A.4AB, A.5A, A.7BC, A.8BC, A.10BCDE 2A.3ABC	IIC1, IIC2
3. Examine and interpret the linear and quadratic graphs of equations and inequalities.	6.10A, 6.12A, 7.5A, 7.11A, 7.14A, 8.5, 8.12C, 8.15A	IID1, IID2
4. Solve application problems.	6.11AB, 6.13B, 7.13AB, 7.15B, 8.14ABCD, 8.16B A.2ABCDEFG, A.3BCE, A.4AC, A.5, A.6A, A.7C, A.8B, A.9, A.11AB G.3BCDE, G.5BCD, G.7C, G.8, G.9, G.10, G.11 2A.4A, 2A.9F, 2A.10B, 2A.11F, M.1AC, M.2CD, M.3A, M.5A,M.8C, P.2A, P.3	VIIIA1, VIIIA2, VIIIA3, VIIIA4, VIIIA5, VIIIB1, VIIIB2, VIIIC1, VIIIC2, VIIIC3, IXA3
5. Use and interpret function notation in both algebraic and graphical contexts.	A.1, A.2, A.3ABCE, A.4AC, A.5AC, A.6, A.7AC, A.8B, A.9, A.10B, A.11BC, A.12A 2A.1, 2A.2B, 2A.4ABC, 2A.7ABC, 2A.9A, 2A.10A M.2D, P.1, P.2A	VIIA1, VIIA2, VIIB1, VIIB2

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Course Description
as defined by RGV - IHEs:

- **College Preparatory A**: Topics include real numbers, rules of exponents, polynomials, factoring, linear equations, linear inequalities, graphing linear equations and inequalities, and rational expressions. An overall grade for the semester of 70 or higher indicates that the student has completed the course and may be considered complete in College Preparatory 1, Elementary Algebra, or equivalent at the RGV-IHEs.

- **College Preparatory B:** Topics include factoring techniques, radicals, algebraic fractions, complex numbers, graphing linear equations and inequalities, quadratic equations, systems of equations, graphing quadratic equations and an introduction to functions. Emphasis is placed on algebraic techniques in order to successfully complete College Algebra. An overall grade for the semester of 70 or higher indicates that the student has met the RGV – IHEs criteria for College Preparatory B, Intermediate Algebra, or its equivalent, and the student is prepared for any entry level college mathematics course at the RGV - IHEs without further assessment or remediation.

WeBWorK (practice and mastery) Recommended/Default Settings

Active learning: Students should be working on the assignments in WeBWorK **in class**, and if they need help then turn to the instructor/textbook/videos (possibly even to classmates through collaboration).

- Assignment for each sections through WeBWorK
  - 10-15 questions
  - Random parameters to have different answers for different students
  - Unlimited attempts, students get immediate feedback whether the answer is correct or not
  - Open until the end of semester
- Weekly quiz (same settings as homework, a few questions)

WeBWorK (practice and mastery) Recommended/Default Settings

- Chapter Assessments (instructor can/should try them out in advance!) More serious than section assignments and quizzes.
  - Timed 50 minutes
  - Around 15-20 questions
  - Unlimited attempts
- Final exam preview (like homework assignment)
- Final exam A/B (provided by UTRGV at the end of each semester)
- Students don't see the assignments unless instructor assigns them

Active Learning

- WeBWorK calls the assignments “Homework Sets”, but they should not be treated as homework.
- Students *have seen* most of this material. They should be working on the assignments during class, and if they need help then turn to the instructor/textbook/videos.
- Use computer labs, or tablets or even smartphones.
- PDF versions could be printed as a last resort. (Timed chapter tests and final exams can be only printed if they are changed to regular assignments.)
- Instructor follows student progress online and concentrates on topics and students showing a need for additional help.
- The set information parts on the right-hand side of the assignments contains links to the html version of the book and to videos. Use them and tell students to use them.

Course Schedule

- Course Calendar (adjust it) posted at https://webwork.utrgv.edu => **Information for High School Teachers Using WeBWorK Courses**
- Approximately 2 sections per week, with weekly quizzes and chapter assessments.
- Should be partially self-paced. Students don't learn at the same rate!
  - Assign all sets to student from the beginning (except for chapter assessments, maybe weekly quizzes)
  - Follow course calendar with mini-lectures (no long lectures!) and examples.
  - Follow student progress in WeBWorK
  - Encourage students to work ahead of schedule, possibly reward them for finishing chapters and the course early.
- Some overlap between parts A and B but must follow schedule! Part B is more difficult than part A.

Growth Based Learning Mindset

- Unlimited attempts for each question, except the final exam has five attempts. (can be changed by instructor)
- Students miss deadlines. Without letting them make up missed assignments they will just fall behind more and more.
  - If you let them know that they can make up all assignments until the end of the semester they will not do anything until the end of the semester.
  - Find a middle ground and let them grow. Possible solutions:
    - Limited time period to make up assignments.
    - Extend close date, make sure answers have not been made available.
    - Set reduced scoring period in WeBWorK.
    - Have an official due date listed outside WeBWorK for 6-week progress reports and leave the due dates up until the end of the semester.
    - Talk to them individually!
  - Your school administration will be happy to work with you and to change student grades up if you explain it to them!

Final Exams

Final exam will be arranged at the end of each semester.

- 30 problems
- 3 parts (10+10+10) default settings, but can be 1 or 2 parts
- Timed (50 minutes each parts)
- 5 attempts for each parts.
- Can be requested as PDF for in-class exam
- Checking students' work on paper is strongly recommended

Meetings: July 30, 2024; September 5, 2024(make-up session); January 9, 2025; April 3, 2025

The commissioner of education, in coordination with the commissioner of higher education, may adopt rules to administer this subsection. §28.014 (c)

- Appropriate faculty of each high school offering courses under this section and appropriate faculty of each institution of higher education with which the school district partners
  - ✓ shall meet regularly as necessary to ensure
  - ✓ That each course is aligned with college readiness expectations.

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Grading

- Successful completion of the course is defined as:
  - overall grade of 70 or higher:
  - The final assessment in part B must compose at least 30% of the course grade.
- Part A is a prerequisite to part B. If your school places students directly into part B in the spring, still require students to do part A.
- Instructors must decide how grading will be calculated and communicated to students.
  - In-class work
  - Homework
  - Quizzes
  - Chapter Tests
  - Final exams
  - Record grades in high school gradebook.

Calculator Use

- Calculator use is up to the instructor.
- Most questions in WeBWorK allow formulas (there is no need for calculator) (2+3*5/7)
- WeBWorK can use Mathquill to help students with answers (javascript based)

  (-3+sqrt(3^2-4*7*5))/(2*7) => $\frac{-3+\sqrt{3^2-4*7*5}}{2*7}$
- Chapter 0 (prealgebra) no formulas are accepted in WeBWorK, and calculator use is strongly discouraged. Students will need basic algebraic skills for working with formulas!
- Decimal numbers need 4-5 significant digits to avoid rounding error.

The Place for Almost Everything

- UTRGV WeBWorK (https://webwork.utrgv.edu) (without www)
  - Open Educational Resource (Free)
  - Compatible with Smart Phones/Tablets
  - Support through UTRGV
  - **Instructor has full control** over his/her own course
  - Students need a lot of practice
  - Turn on achievements for gamification!
  - Courses are deleted in July and must be requested for next academic year: andras.balogh@utrgv.edu
  - Email address can be found at https://webwork.utrgv.edu

WeBWorK Online Assignments

- WeBWorK is an open and free software written under a grant from the National Science Foundation and the Mathematical Association of America (MAA) in 1998.
- It is current supported by the MAA and is used worldwide in hundreds of universities.
- UTPA/UTRGV has had a WeBWorK server since 2002.
- Originally designed for Calculus, it now has a national problem library of 500,000 problems.
- As an open-source software, it is freely available.
- Clean, text-based browser interface, even through smartphones (instructors should use desktop interface)

WeBWorK Page

https://webwork.utrgv.edu => page link:
Information for High School Teachers Using WeBWorK Courses

- General HB5 and TSI waiver information
- Copy of workshop presentation slides (will be updated)
- Syllabi
- Course Calendar (modify it to fit your school)
- Technical help to use WeBWorK (It is not more complicated than solving algebra problems.)

Basics of Using WeBWorK

To start your HB5 College Prep math course, you need to:

1. Request the course: Andras.Balogh@utrgv.edu (need school name and start date)
2. Add students to your class list
3. Recommended to keep all your periods (sections) in the same course shell. Assignments can be handled separately in the same course.
4. Adjust the default open dates, due dates, and answer dates of your assignments if needed.
5. Assign the sets to students
6. Later:
    1. Mini lectures => in-class work => homework
    2. Weekly quizzes
    3. Chapter tests (timed)
    4. Final exam (timed)
    5. Monitor student progress (you can see correct solutions, students' solution)
    6. Download student grades as an excel sheet.
    7. Calculate overall course grades separately, provide six-week progress reports, etc.

WeBWorK for other Mathematics Classes

UTRGV is pleased to be able to offer access to our WeBWorK server at your high schools. In addition to College Prep Math courses there are templates for:

- TSI Preparation Workshop (shortened version of the College Prep Math course)
- Algebra 2
- College Algebra
- Pre-Calculus
- Calculus
- Statistics

You can request one of these courses through Andras.Balogh@utrgv.edu. (webwork.utrgv.edu: *Technical Questions*)

This service is free to all high schools in South Texas as part of the *Community Engagement Mission of UTRGV.*

Some Common Questions

1. ***Who should take these college prep course(s)?***

Answer: These courses are for "bubble" students who want to go to college and have passed their EOC exams in reading, writing, and/or math, but are not yet college ready in one or more of those areas.

Some Common Questions

2. What if we already offer an ACT/SAT/TSI prep course on our high school campus?

Answer: The College Prep Courses have been designed to meet a specific set of learning outcomes. They are not designed to improve student performance on tests, but rather to set up students for success in their entry level college mathematics and English courses.

Some Common Questions

3. Where does the curriculum for the college prep courses come from?

Answer: The mathematics course follows the objectives from Algebra closely. The curriculum is augmented with online software such as the suggested WeBWorK.

The English faculty from the partnering institutions have developed the ELA SLOs and curriculum and provided a free integrated reading-writing textbook, *College Transitions*, available online.

Some Common Questions

4. What do the final assessments look like? Who grades them?

Answer:

For mathematics the students will have a common final exam, initially graded by the online homework system. Instructors will be able to assign partial credit. PDF version of the final exam is also available for delivery as paper exam.

For reading/writing, students will turn in a portfolio of their work containing four writing assignments revised throughout the entire course. Instructors will assess the portfolios using the final assessment guidelines provided in conjunction with the textbook.

Some Common Questions

6. **How long will a student who successfully completes the college prep course be considered "college ready" in the respective area(s) at the partnering IHEs?**

Answer: The waiver the students are earning will be good for two years from their date of graduation. However, students can retake the TSI Assessment at any time to prove college-readiness in math, reading, and/or writing.

Some Common Questions

7. **What happens if a student retests and becomes college-ready in the middle of the course?**

Answer: What a great problem to have!

Students could be dropped from the course, provided it does not harm their academic plan.

Both courses are designed to provide rigorous preparation for college and completing them may give students an edge in their entry level college courses.

Some Common Questions

8. **Will successful completion of the college prep course and final assessment guarantee admission into the partnering institutions of higher education?**

Answer: No, institutions of higher education will determine admission to their respective programs.

Frequently Asked Questions

1. Is the CPC a TSI exemption option for dual enrollment courses?
   - No
2. Can students take this course prior to their 12th grade year to be eligible for dual enrollment courses?
   - No
3. Will the CPC be offered as a dual enrollment course at any of the RGV IHEs?
   - No
4. Are students required to enroll in CPC this year?
   - No
5. Can the CPC course be used as an advanced ELA or math course for the endorsements?
   - Yes
6. Are teachers teaching this course required to have a master's degree?
   - No
   - MOU: high schools "To provide highly qualified instructors for the courses being taught (Math and ELA Secondary Certification)"

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Contact Information

Region I

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WeBWorK Demonstration

https://webwork.utrgv.edu =>
Information for High School Teachers Using WeBWorK Courses

- Technical details about how to use WeBWorK It is not more complicated than solving algebra problems.