# MATH 511.001 – INTRODUCTION TO REAL ANALYSIS
# COURSE SYLLABUS: FALL 2017

**Instructor:** Dr. Mehmet Celik
**Office Location:** Binnion 323
**Office Hours:** Mon. 10am-12:00pm; Tues. 10am-1:00pm; Wed. 10am-12:00pm; Thur. 10am-12pm or by appointment
**Office Phone:** 903-886-5944
**Office Fax:** 903-886-5945
**University Email Address:** Mehmet.Celik@tamuc.edu can email the instructor through eCollege
**Preferred Form of Communication:** email
**Instructor Communication Policy:** Student course-related questions or concerns through email are answered usually within 24 hours during week days (M-F).
**Class Meeting Time:** MW 5:00p-6:15p
**Class Location:** Commerce - BA338; Metroplex - 131; Navarro College - BC322

## COURSE INFORMATION

**Materials**
**Textbook(s) Required:** The main text is *Basic Analysis: Introduction to Real Analysis* by Jiří Lebl, version 4.0, it is free online at http://www.jirka.org/ra/ Another book that you can use is Introduction to Real Analysis by William Trench William F. Trench, Introduction to real analysis, Pearson Education, 2003. (freely downloadable)
http://ramanujan.math.trinity.edu/wtrench/texts/TRENCH_REAL_ANALYSIS.PDF.

Another book that you may consider using is Walter Rudin, Principles of mathematical analysis, 3rd ed., McGraw-Hill Book Co., New York, 1976. International Series in Pure and Applied Mathematics.

**MathType:** This software is for typing mathematics symbols and equations. It is easy to use. The mathematics department owns a departmental license. If you want to install it on your computer, please let me know what type of your computer operating system is: Windows, or Macintosh.

**Course Description:** This is the first part of a two-semester course in Introduction to Real Analysis. Topics include real number system; sequences and series; limit, continuity and differentiation; the Riemann integral; sequences and series of functions; elementary metric space theory including compactness, connectedness and completeness; differentiation and integration of functions of several variables.

**Student Learning Outcomes**

By the end of the course, students should be able to **describe** the real line as a complete, ordered field; **use** the definitions of convergence as they apply to sequences, series, and functions; **determine** the continuity, differentiability, and integrability of functions defined on subsets of the real line; **apply** the Mean Value Theorem and the Fundamental Theorem of Calculus to problems in the context of real analysis; **write** solutions to problems and proofs of theorems that meet rigorous standards based on content, organization and coherence, argument and support, and style and mechanics; **determine** the Riemann integrability of a bounded function and prove a selection of theorems concerning integration; **recognize** the difference between pointwise and uniform convergence of a sequence of functions; **illustrate** the effect of uniform convergence on the limit function with respect to continuity, differentiability, and integrability.

# COURSE REQUIREMENTS

## Course Evaluation Methods

This course will utilize the following instruments to determine student grades and proficiency of the learning outcomes for the course.

**Exam** – (proctored) There will be one in-term exam. You will have a period of 120 minutes to complete the exam.
**In-term exam date:** Monday October 23$^{rd}$ (Week #9) 5pm-7pm
Make-up exam is possible only if there is a documented emergency.

**Final Exam:** (proctored) A Comprehensive Final Exam (120 minute of exam time).
**Final Exam Date:** Monday, December 11$^{th}$, starts at 5pm

Each exam must be proctored. If you cannot take an exam on the Commerce campus, you need to let your instructor know the location where you want to take a test on or before September 15$^{th}$, 2017. If you have questions, discuss it with your instructor immediately.

**Attendance:** Class attendance and participation is expected because the class is designed as a shared learning experience and because essential information not in the textbook will be discussed in class. Students are responsible to notify the instructor if they are missing class and for what reason. Students are also responsible to make up any work covered in class. It is recommended that each student coordinate with a student colleague to obtain a copy of the class notes, if they are absent. It is critical you keep up with the pace of this class. A term goes quickly. Once you are behind our pace, you can easily get lost. I strongly suggest you to study ahead of our pace continuously review the material.

**Homework:** There will be weekly homework assignments. Each assignment will be graded. Missing questions and answers without work do not earn credit. The questions for a homework assignment will be posted on the assignment under

eCollege. The due date for each homework assignment will be announced with the assignment. Late homework submission won't be accepted.

You may work together and discuss homework. You may also ask your instructor for a hint.

Scan and submit your homework to Dropbox at eCollege as LastName_FirstName_HW1_Math511.pdf (Example: CelikMehmet_HW1_Math511.pdf).

The homework assignment you submit must be your own work. Plagiarism is strictly prohibited.

**The key to success:** After every lecture, self-studying is important to develop breadth and depth of the content. If you are not able to understand the content on your own, find someone (classmate or your professor) that understands the material and frequently talk to that person. In this course, doing the homework assignment early and asking questions when you have them is extremely important.

**Workload and Assistance:** You should expect to spend about 8 to 12 hours each week, on the course material. This includes studying the posted material, working on homework assignments, and preparing for the exams. Some weeks (those in which an exam is scheduled, for instance) may require more of your time, other weeks may require less, but on average, budget 8 to 12 hours each week. You should spend some time working with other class mates. Make use of my office hours. You may email me at any time. Emails are answered usually within 24 hours during week days (M-F).

# GRADING

**Grading Matrix:** This class will be graded on a total points system. 400 points are possible in the class. The following grading matrix presents how your total score is going to be calculated at the end of the semester of Fall 2017 for Math 511.001 course. All the grading instruments are assigned between the first day of class and last day of class of fall 2017 semester. The Final exam is the last grading instrument of the course; the date of the Final Exam is Monday, December 11th, starts at 5pm. The grade is completely objective and is determined solely by student performance on each of the evaluation criteria (One Mid-term exam, HW assignments, and the final exam). *Do not expect Extra Credit assignments!*

| Instrument | Value (points) | Total |
|---|---|---|
| HW Assignments | At the end of the semester the average of all HW assignments will be considered. | 130pts |

| Mid-term Exam | One mid-term exam at 135 points | 135pts |
|---|---|---|
| Final Exam | One comprehensive final exam at 135 points | 135pts |
| Total: | | 400pts |

Grade Determination:

A = 400 – 360 pts; i.e. 90% or better

B = 320 – 359 pts; i.e. 80 – 89 %

C = 280 – 319 pts; i.e. 70 – 79 %

D = 240 – 279 pts; i.e. 60 – 69 %

F = 239 pts or below; i.e. less than 60%

# TECHNOLOGY REQUIREMENTS

A computer algebra system will be used for some problem exploration, enhanced conceptual understanding, and to engage students as active participants in the learning process.

- **TI-83/84** or other calculators with similar capability is recommended.
- **Printer** to print homework and tests is recommended.
- **Scanner/digital camera/cell phone** that you can take pictures of your work and submit them to the Dropbox at the eCollege.
- **eCollege:** As a student enrolled at Texas A&M University-Commerce, you have access to eCollege. You will obtain course materials through eCollege. The course materials are only for this course. You cannot distribute the course materials without permission of the instructor. You also have an email account via myLeo - all my emails sent from eCollege (and all other university emails) will go to this account, so please be sure to check it regularly.

# COMMUNICATION AND SUPPORT

**Interaction with Instructor Statement**

An eCollege website has been created for the course which may be accessed from student myLEO accounts following the eCollege and then the My Courses tabs. All files and documents that the instructor shares with the class will be posted in the Document Sharing folder in the course website. eCollege is the Learning Management System used by Texas A&M University-Commerce. You will need your CWID and password to log in to the course. If you do not know your

CWID or have forgotten your password, contact Technology Services at 903.468.6000.

My primary form of communication with the class will be through eCollege Email and Announcements.  Any changes to the syllabus or other important information critical to the class will be disseminated to students in this way via your eCollege Email address available to me through MyLeo and in Announcements.  It will be your responsibility to check your eCollege Email and Announcements regularly.

# COURSE AND UNIVERSITY PROCEDURES/POLICIES

## Course Specific Procedures

### Policy for Reporting Problems with eCollege

If students encounter eCollege-based problems while submitting assignments and assessments, the following procedures MUST be followed.

1. Students must report the problem to the help desk. You may reach the helpdesk at helpdesk@online.tamuc.org or 1-866-656-5511
2. Students MUST file their problem with the helpdesk and obtain a helpdesk ticket number
3. Once a helpdesk ticket number is in your possession, students should email me to advise me of the problem and to provide me with the helpdesk ticket number
4. At that time I will call the helpdesk to confirm your problem and follow up with you.

PLEASE NOTE: Your personal computer/access problems are not a legitimate excuse for filing a ticket with the help desk. You are strongly encouraged to check for compatibility of your browser BEFORE the course begins and to take the eCollege tutorial offered for students who may require some extra assistance in navigating the eCollege platform. ONLY eCollege-based problems are legitimate.

## University Specific Procedures

### Academic Honesty
Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including (but not limited to) receiving a failing grade on the assignment, the possibility of failure in the course and dismissal from the University.  Since dishonesty harms the individual, all students, and the integrity of the University, policies on scholastic dishonesty will be strictly enforced.  In ALL instances, incidents of academic dishonesty will be reported to the Department Head. Please be aware that academic dishonesty includes (but is not limited to) cheating, plagiarism, and collusion.

*Cheating* is defined as:

- Copying another's test of assignment
- Communication with another during an exam or assignment (i.e. written, oral or otherwise)
- Giving or seeking aid from another when not permitted by the instructor
- Possessing or using unauthorized materials during the test
- Buying, using, stealing, transporting, or soliciting a test, draft of a test, or answer key

*Plagiarism* is defined as:
- Using someone else's work in your assignment without appropriate acknowledgement
- Making slight variations in the language and then failing to give credit to the source

*Collusion* is defined as:
- Collaborating with another, without authorization, when preparing an assignment

If you have any questions regarding academic dishonesty, ask. Otherwise, I will assume that you have full knowledge of the academic dishonesty policy and agree to the conditions as set forth in this syllabus.

## ADA Statement

### Students with Disabilities
Students with Disabilities information: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact: Office of Student Disability Resources and Services, Gee Library, Room 132 (903) 886-5150 or (903) 886-5835 phone (903) 468-8148 fax Email:.

### Office of Student Disability Resources and Services
Texas A&M University-Commerce
Gee Library- Room 162
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
Rebecca.Tuerk@tamuc.edu

### Student Conduct
All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. (See *Student's Guide Handbook, Policies and Procedures, Conduct.*) This means that rude and/or disruptive behavior will not be tolerated.
Texas A&M University – Commerce is committed to a safe, accepting environment for all students regardless of sexual orientation, gender identification, or gender expression: A&M-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on

the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

## Copyright Policy

The handouts used in this course are copyrighted. By "handouts," I mean all materials generated for this course, which include but are not limited to syllabi, lecture notes, quizzes, exams, in-class materials, review sheets, projects, and problems sets. Because these materials are copyrighted, you do not have the right to copy and distribute the handouts.

## Campus Concealed Carry

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations. For a list of locations, please refer to (http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf) and/or consult your event organizer). Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

# COURSE OUTLINE / CALENDAR

## WEEKLY SCHEDULE:

**(Weeks 1&2)** *Real Numbers*
**(Week 3)** *Sequences and Limits*
**(Weeks 4&5)** *Facts about limits of sequences; Limit superior, limit inferior, and Bolzano-Weierstrass; Cauchy Sequences*
**(Week 6)** *Series*

**(Weeks 7&8)** *Limits of Functions; Continuous Functions; Min-max and intermediate value theorems*
**(Week 9)** *Exam, Uniform Continuity*
**(Weeks 10&11)** *The Derivative; Mean value theorem; Taylor's theorem; Inverse function theorem*

**(Weeks 12&13)** *The Riemann Integral; Properties of the integral; Fundamental theorem of calculus*
**(Weeks 14&15)** *Sequence of Functions (Pointwise and uniform convergence; Interchange of limits; Picard's theorem)*

**(Week 16).** *Final Exam Week*

This schedule is subject to change by the instructor. Any changes to this schedule will be communicated by email and announcements on the course web page.