

# **MATH 539.01W - FUNCTIONS OF COMPLEX VARIABLES II**

**(WEB BASED CLASS)**

## **COURSE SYLLABUS: SPRING 2025**

**Office Hours:** On-Campus

Monday 10AM–11:30AM

Tuesday 11AM–12PM

Wednesday 10:30AM–12PM

Tuesday 11AM–12PM

or by appointment.

**Office Hours:** On-Zoom

Tuesday and Thursday 10am – 11am or by appointment.

**Office Phone:** 903-886-5944

**Office Fax:** 903-886-5945

**University Email Address:** [Mehmet.Celik@tamuc.edu](mailto:Mehmet.Celik@tamuc.edu)

**Preferred Form of Communication:** email

**Communication Response Time:** Student course-related questions or concerns through email are answered usually within 24 hours during weekdays (M-F).

**Class Meeting Time:** Regularly log into our online course

**Class Location:** D2L (under MyLeo)

## **COURSE INFORMATION**

### **MATERIALS**

**Textbook(s) Required:** Textbook(s) Required: The main text is A First Course in Complex Analysis by Matthias Beck, Gerald Marchesi, Dennis Pixton, and Lucas Sabalka, version 1.5, it is free online at [math.sfsu.edu/beck/papers/complex.pdf](http://math.sfsu.edu/beck/papers/complex.pdf). A good source for many solved problems with solutions is Schaum's Outline of Complex Variables, second edition, by Murray R. Spiegel, Seymour Lipschutz, John J. Schiller, and Dennis Spellman, McGraw-Hill, 2009, ISBN 9780071615693. Another great book that we may use is Complex Variables with Applications by Saminathan Ponnusamy and Herb Silverman, Publisher: Birkhäuser; 2006 edition ISBN-10: 0817644571 ISBN-13: 978-0817644574. We may occasionally cover enrichment activities, not in the text.

**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 course is a sequel to Math 538, which is the prerequisite. The course covers the representation of holomorphic functions by power series and by integrals. We

will recall complex line integrals Cauchy's integral formula, and some of its applications. We will continue studying singularities of holomorphic functions, Laurent series, and computation of definite integrals by residues. Then, we will look into some applications such as the Laplace transform, the inverse Laplace transform, and Fourier transform. We will discuss the topic of harmonic functions further, then conformal mappings will be recalled and Schwarz-Christoffel Transformations will be introduced. Poisson Integral Formulas and some applications to boundary-value problems will also be studied. We will look into a method for solving a Dirichlet Problem. We will also describe a process for solving a new type of boundary value problem that relies on finding a conformal mapping between two domains. Consequently, we will look into Neumann Problems. Certain types of Neumann and Dirichlet problems occur naturally in the study of electrostatics, fluid flow, gravitation, and heat flow. Some of those applications will also be reviewed.

## STUDENT LEARNING OUTCOMES

### BY THE END OF THE COURSE, STUDENTS SHOULD BE ABLE

1. to **analyze** functions of a complex variable using series expansions, using line integrals, using geometry, and using partial differential equations;
2. to **explain** the major theorems that distinguish complex analysis from real analysis; and
3. to **apply** complex analysis to compute geometric mappings and real integrals.

## 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.

**Mid-term exam** – (proctored) There will be one mid-term exam. You will have a period of 100 minutes to complete the exam.

**Exam:** Thursday March 6<sup>th</sup> (Week #8) from 6pm

Make-up exams are possible only if there is a documented emergency.

**Final Exam:** (proctored) A Comprehensive Final Exam (2 hours of exam time).

**Final Exam Date:** Tuesday, May 6<sup>th</sup> from 6pm to 8pm

Each exam is worth 135 points.

Each exam will be proctored through ZOOM. The ZOOM link to the Virtual Exam room will be provided in advance by the instructor. **To take the exams, you need to have a webcam and a microphone both in working conditions.**

**Attendance:** Online attendance is required. 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. Online attendance in this course is determined by your login and participation in our course in D2L.

Attendance means students will participate in watching posted videos, joining online discussions, and submitting required homework assignments on time.

**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 weekly module assignment under D2L. 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 under the **Discussions** sub-module under every **Week's module** on D2L.

Submit your homework to the virtual assignment basket located at **[Activities]→[Assignments] →[Homework # on the Assignment Submission Folders]** at D2L as *LastName\_FirstName\_HW#?\_Math539.pdf* (Example: Celik\_Mehmet\_HW#2\_Math539.pdf).

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

**The key to success** in this course is regularly working with other students in the class through **Discussions** on D2L, doing the homework assignment early, and asking questions when you have them!!! You can ask your instructor during his Virtual Office Hours.

**Workload and Assistance:** You should expect to spend about 12 to 14 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 12 to 14 hours each week. You should spend some time working with other classmates on **Discussions** or **Virtual Office** under **D2L!** Please ask questions and seek assistance as needed. You may email me at any time. Emails are answered usually within 24 hours during weekdays (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 Spring 2025 for the Math 539.01E course. All the grading instruments are assigned between the first day of class and the last day of class of the Spring 2025 semester. The Final exam is the last grading instrument of the course; the date of the Final Exam is **Tuesday, May 6<sup>th</sup> from 6pm to 8pm**. 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!*

<b>Instrument</b>	<b>Value (points)</b>	<b>Total</b>
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.
- **D2L:** As a student enrolled at East Texas A&M University, you have access to D2L. You will obtain course materials through D2L, (MyLe→ APPs→ D2L). 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 D2L (and all other university emails) will go to this account, so please be sure to check your email regularly.

D2L is committed to performing key application testing when new browser versions are released. New and updated functionality is also tested against the latest version of supported browsers. However, due to the frequency of some browser releases, D2L cannot guarantee that each browser version will perform as expected. If you encounter any issues with any of the browser versions listed in the tables below, contact D2L Support, who will determine the best course of action for resolution. Reported issues are prioritized by supported browsers and then maintenance browsers.

Supported browsers are the latest or most recent browser versions that are tested against new versions of D2L products. Customers can report problems and receive support for issues. For an optimal experience, D2L recommends using supported browsers with D2L products.

Maintenance browsers are older browser versions that are not tested extensively against new versions of D2L products. Customers can still report problems and receive support for critical issues; however, D2L does not guarantee all issues will be addressed. A maintenance browser becomes officially unsupported after one year.

Note the following:

- Ensure that your browser has JavaScript and Cookies enabled.
- For desktop systems, you must have Adobe Flash Player 10.1 or greater.
- The Brightspace Support features are now optimized for production environments when using the Google Chrome browser, Apple Safari browser, Microsoft Edge browser, Microsoft Internet Explorer browser, and Mozilla Firefox browsers.

### DESKTOP SUPPORT

<b>Browser</b>	<b>Supported Browser Version(s)</b>	<b>Maintenance Browser Version(s)</b>
Microsoft® Edge	Latest	N/A
Microsoft® Internet Explorer®	N/A	11
Mozilla® Firefox®	Latest, ESR	N/A
Google® Chrome™	Latest	N/A
Apple® Safari®	Latest	N/A

### TABLET AND MOBILE SUPPORT

Device	Operating System	Browser	Supported Browser Version(s)
Android™	Android 4.4+	Chrome	Latest
Apple	iOS®	Safari, Chrome	The current major version of iOS (the latest minor or <b>point</b> release of that major version) and the previous major version of iOS (the latest minor or <b>point</b> release of that major version). For example, as of June 7, 2017, D2L supports iOS 10.3.2 and iOS 9.3.5, but not iOS 10.2.1, 9.0.2, or any other version.  Chrome: Latest version for the iOS browser.
Windows	Windows 10	Edge, Chrome, Firefox	Latest of all browsers, and Firefox ESR.

- You will need regular access to a computer with a broadband Internet connection. The minimum computer requirements are:
  - 512 MB of RAM, 1 GB or more preferred
  - Broadband connection required courses are heavily video intensive
  - Video display capable of high-color 16-bit display 1024 x 768 or higher resolution
- You must have a:
  - Sound card, which is usually integrated into your desktop or laptop computer
  - Speakers or headphones.
  - \*For courses utilizing video-conferencing tools and/or an online proctoring solution, a webcam and microphone are required.
- Both versions of Java (32 bit and 64 bit) must be installed and up to date on your machine. At a minimum Java 7, update 51, is required to support the learning management system. The most current version of Java can be downloaded at: JAVA web site <http://www.java.com/en/download/manual.jsp>

- Current anti-virus software must be installed and kept up to date.

Running the browser check will ensure your internet browser is supported.

Pop-ups are allowed.

JavaScript is enabled.

Cookies are enabled.

- You will need some additional free software (plug-ins) for enhanced web browsing. Ensure that you download the free versions of the following software:
  - [Adobe Reader](https://get.adobe.com/reader/) <https://get.adobe.com/reader/>
  - [Adobe Flash Player](https://get.adobe.com/flashplayer/) (version 17 or later) <https://get.adobe.com/flashplayer/>
  - [Adobe Shockwave Player](https://get.adobe.com/shockwave/) <https://get.adobe.com/shockwave/>
  - [Apple Quick Time](http://www.apple.com/quicktime/download/) <http://www.apple.com/quicktime/download/>

At a minimum, you must have Microsoft Office 2013, 2010, 2007 or Open Office. Microsoft Office is the standard office productivity software utilized by faculty, students, and staff. Microsoft Word is the standard word processing software, Microsoft Excel is the standard spreadsheet software, and Microsoft PowerPoint is the standard presentation software. Copying and pasting, along with attaching/uploading documents for assignment submission, will also be required. If you do not have Microsoft Office, you can check with the bookstore to see if they have any student copies.

### **ACCESS AND NAVIGATION**

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or [helpdesk@tamuc.edu](mailto:helpdesk@tamuc.edu).

**NOTE:** Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

## **COMMUNICATION AND SUPPORT**

### **BRIGHTSPACE SUPPORT**

#### **NEED HELP?**

#### **STUDENT SUPPORT**

If you have any questions or are having difficulties with the course material, please contact your Instructor.

#### **TECHNICAL SUPPORT**

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778 or click on the **Live Chat** or click on the words "click here" to submit an issue via email.



## **SYSTEM MAINTENANCE**

D2L runs monthly updates during the last week of the month, usually on Wednesday. The system should remain up during this time unless otherwise specified in an announcement. You may experience minimal impacts to performance and/or look and feel of the environment.

## **INTERACTION WITH INSTRUCTOR STATEMENT**

Student course-related questions or concerns through email are answered usually within 24 hours during week days (M-F). Feedback on assessments will be provided within 7 days after the assignment is submitted.

My primary form of communication with the class will be through the official university 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 D2L Email address available to me through MyLeo and in Announcements. It will be your responsibility to check your official university Email and Announcements regularly.

**Discussions:** This space is for students to communicate with each other. I may visit Discussions and join your discussion. Please feel free to answer one another's questions. I will check answers (as well as questions) for correctness, but do not hesitate to respond to a posting if you feel you can answer the question thoroughly and directly.

## **STUDENT ACADEMIC RESOURCES**

**Math Lab:** Free tutoring service offered by the Mathematics department (Binnion Hall Room 328). Please visit the web site for the hours of operation and more details.

<http://www.tamuc.edu/academics/colleges/scienceEngineeringAgriculture/departments/mathematics/students/default.aspx>

**The TAMUC One Stop Shop** - provides as many student resources as possible in one location.

<http://www.tamuc.edu/admissions/oneStopShop/>

**The TAMUC Academic Success Center** provides academic resources to help you achieve academic success.

<http://www.tamuc.edu/CampusLife/CampusServices/AcademicSuccessCenter/default.aspx>

## **COURSE AND UNIVERSITY PROCEDURES/POLICIES**

### **COURSE SPECIFIC PROCEDURES**

**Policy for Reporting Problems with eCollege**



If students encounter D2L-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](mailto: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 D2L-based problems are legitimate.

### **SYLLABUS CHANGE POLICY**

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

### **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 or 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.

### **East Texas A&M Supports Students' Mental Health**

**The Counseling Center at East Texas A&M, located in the Halladay Building, Room 203, offers counseling services, educational programming, and connection to community resources for students. Students have 24/7 access to the Counseling Center's crisis assessment services by calling 903-886-5145. For more information regarding Counseling Center events and confidential services, please visit [www.tamuc.edu/counsel](http://www.tamuc.edu/counsel)**

### **ADA STATEMENT**

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**

East Texas A&M University

Gee Library- Room 162

Phone (903) 886-5150 or (903) 886-5835

Fax (903) 468-8148

Email: [studentdisabilityservices@tamuc.edu](mailto:studentdisabilityservices@tamuc.edu)

Website: [Office of Student Disability Resources and Services](http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/)

<http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/>

#### **Student Conduct**

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the [Student Guidebook](http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx).

<http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx>

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum:

[Netiquette http://www.albion.com/netiquette/corerules.html](http://www.albion.com/netiquette/corerules.html)

#### **TAMUC Attendance**



For more information about the attendance policy please visit the [Attendance](#) webpage and [Procedure 13.99.99.R0.01](#).

<http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx>

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf>

### **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.

### **NONDISCRIMINATION NOTICE**

East Texas A&M University 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.

### **CAMPUS CONCEALED CARRY STATEMENT**

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in East Texas A&M University 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 East Texas A&M Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the [Carrying Concealed Handguns On Campus](#) document and/or consult your event organizer.

Web url:

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf>

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all East Texas A&M campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

## **COURSE OUTLINE / CALENDAR**

### **WEEKLY SCHEDULE:**

**(Weeks 1&2)** *Taylor and Laurent Series*

**(Weeks 3)** *Zeros and Poles*

**(Week 4)** *Residue and Residue Theorem*

**(Weeks 5, 6, & 7)** *Some Consequences of the Residue Theorem*



## EAST TEXAS A&M

*(evaluating real integrals of certain forms)*

**(Week 8) Exam**

**(Week 9)** Applications:  
Integral Transforms (Laplace  
Fourier)

**(Week 10)** Harmonic  
Functions

**(Week 11)** Applications:  
Dirichlet Problem

**(Week 12 & 13)** Conformal  
Mappings (revisited);  
Schwarz-Christoffel  
Transformations

**(Week 14)** Poisson Integral  
Formulas; Applications:

Boundary Value Problems

**(Week 15)** Applications:  
Boundary Value Problems

**(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.