



## MATH 597, Coding Theory

COURSE SYLLABUS: SPRING- 2022

### INSTRUCTOR INFORMATION

Instructor:	Padmapani (Pani) Seneviratne
Office Location:	BIN 316
Office Hours:	T:12:00 – 3:00 pm, W – 1:00 – 3:00 pm or virtual by Appointment
Office Phone:	903-886-5952
Office Fax:	903-886-5945
University email:	<a href="mailto:padmapani.seneviratne@tamuc.edu">padmapani.seneviratne@tamuc.edu</a>
Preferred Communication:	email
Response time:	within 24 hours during weekdays
Class Location:	MyLeo online(D2L)
Class Time:	online

### COURSE INFORMATION

**Textbook:** There is no specific text book for this class. Class notes will be available on D2L.

**Recommended Reading:**

- (1). Introduction to Coding Theory, Ron M. Roth, Cambridge University Press, 978-0-521-84509-5.
- (2). Fundamentals of Error Correcting Codes, W. Cary Huffman and Vera Pless, Cambridge University Press, 978-0521131704
- (3). Introduction to Coding Theory, *Third Edition*, J. H. Van Lint, Springer.

**Software :** Magma computer Algebra system will be provided.

**Calculator:** optional.

*The syllabus/schedule are subject to change.*

## Course Description

Linear codes, bounds on the parameters of codes, rings and fields, cyclic codes, BCH codes, Reed-Solomon codes, decoding techniques, convolutional codes, other trending topics.

Prerequisites: C or higher in Math 500 or Math 531.

**Student Learning Outcomes** Upon successful completion of this course students will:

- Understand theoretical and practical applications of error-correcting codes.
- Construct generator and parity check matrices of linear codes.
- Use rings and finite fields to construct different classes of codes such as BCH codes.
- Use algebraic techniques to construct generator polynomials and matrices for cyclic codes.
- Learn similarities and differences between convolutional codes and linear codes.
- Demonstrate an understanding of decoding techniques for different classes of codes.
- Learn to implement algorithms using the Magma computer algebra system.

## COURSE REQUIREMENTS

### Minimal Technical Skills Needed

Access MyLeo online. Learn and use of Magma computer algebra system.

### Instructional Methods

In this class we will use Magma computer algebra system to illustrate concepts interactively. Online lectures will be uploaded to MyLeo online for each chapter.

### Student Responsibilities or Tips for Success in the Course

#### Attendance:

Online attendance is required. Online attendance is determined by homework submission, video lecture views and proctored exam attendance.

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## **Exams**

There will be one midterm exam and a final exam/presentation. All exams will be proctored remotely using zoom.

## **Home Work:**

Please submit the homework in pdf format as a single file. Write clearly on white A4 paper and keep space between lines. Save the file as firstname\_lastname\_HW#.pdf. Keep the original copy with you.

## **Project:**

Students will do a project on a research topic related to Coding Theory, write a project report, and do a presentation as their final exam grade.

## **GRADING**

Final grades in this course will be based on the following scale:

Midterm Exam:	30%
Home Work:	30%
Final project	20%
Final Exam/presentation:	20%
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Total:	100%

A = 90%-100%

B = 80%-89%

C = 70%-79%

D = 60%-69%

F = 59% or Below

**Midterm Exam: Thursday 03<sup>rd</sup> March 2022, 5 – 7 pm online.**

**Final Exam/Presentation: Friday, 6<sup>th</sup> May 2022, 5-7 pm online.**

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# TECHNOLOGY REQUIREMENTS

## LMS

All course sections offered by Texas A&M University-Commerce have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are technical requirements

LMS Requirements:

<https://community.brightspace.com/s/article/Brightspace-Platform-Requirements>

LMS Browser Support:

[https://documentation.brightspace.com/EN/brightspace/requirements/all/browser\\_support.htm](https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm)

## 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

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. Other support options can be found here:

<https://community.brightspace.com/support/s/contactsupport>

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# **COURSE AND UNIVERSITY PROCEDURES/POLICIES**

## **Course Specific Procedures/Policies**

You are expected to attend all classes.

### **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**

### **Student Conduct**

Appropriate classroom behavior is required to attend this class.

All cell phones must be put on silent during class.

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>

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

<https://www.britannica.com/topic/netiquette>

### **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>

### **Academic Integrity**

Students at Texas A&M University-Commerce are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:

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[Undergraduate Academic Dishonesty 13.99.99.R0.03](#)

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf>

[Graduate Student Academic Dishonesty 13.99.99.R0.10](#)

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10GraduateStudentAcademicDishonesty.pdf>

### **Students with Disabilities-- 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**

Texas A&M University-Commerce

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/>

### **Nondiscrimination Notice**

Texas A&M University-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.

### **Campus Concealed Carry Statement**

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.

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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 A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

**The Counseling Center at A&M-Commerce, 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)**

## COURSE OUTLINE / CALENDAR

### Weekly Schedule

Week	Topic
1-2	Introduction to Coding Theory/Magma
2-3	Linear codes
3-4	Bounds
4-5	Finite fields
6-7	Cyclic codes
8-9	BCH codes
10-11	Reed-Solomon codes
12-13	Decoding techniques
14	Convolutional codes
15	Other topics

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