IS 351.01W 80957
Science Inquiry I

Or, how Science works, featuring magnetism, energy and interactions

COURSE SYLLABUS: FALL 2024

Instructor: Dr. William Newton
Office Hours: I will arrange Zoom-based office hours via a poll when the class begins**.** We'll go for office hours twice a week for 1 hour each
University Email Address: william.newton@tamuc.edu
Preferred Form of Communication: Email
Communication Response Time: 24 hours except at weekends

COURSE INFORMATION

Textbook(s) Required: all available for online purchase at the links below. You should make sure you purchase both online books by the end of week 1 (Friday August 31)

Next Gen PET "Magnetism and Static Electricity" Module (Lecture version) - **$10**

Next Gen PET "Interactions and Energy" Module (Lecture style) **- $10**

Once purchased, the books will be available on the website's e-reader. They are not available for download and printing out. However, it is useful if you have hard copies of the books for you to write the activities in, and so if you send me proof of purchase of the books, I will send you a pdf copy which can be downloaded.

NextGen PET

We will be using the NextGen Physical Science and Everyday Thinking (PET) curriculum in this class.

Syllabus/schedule subject to change

General information about this curriculum can be found here:
https://nextgenpet.activatelearning.com

Next Gen PET materials can be found here (note – we'll be using the "lecture-style" materials:
https://nextgenpet.activatelearning.com/lecture-style-class

Content student resources can be found here:
http://nextgenpet.sdsu.edu/sc/index.html

The Teaching and Learning Extensions can be found here:
http://nextgenpet.sdsu.edu/extensions/index_tl.html

Course Description:

Science topics and themes are chosen to emphasize broad concepts highlighted in the Texas and National Science Standards. Topics include the fundamental processes of science, the scientific model of magnetism, and the description of physical interactions using the concepts of energy, including types of energy such as kinetic energy, potential energy and thermal energy, and universal principles such as the transfer of energy between objects under the rule of conservation of energy. The course will be taught using an inquiry based method, modeling instructional techniques proven effective by current educational research. This course is designed for interdisciplinary majors. It will not count towards a major in the sciences. Prerequisites: Junior level standing

Student Learning Outcomes

1. Students will understand the basic methodology of science: the practice of developing a scientific model. Students will engage in the process of developing a scientific model, and be able to reflect on the process after.
2. Students will be able to describe a good scientific model of magnetism and apply it to explain and predict real-world phenomena and solve problems involving magnetism.
3. Students will be able describe the energy model of interactions and use giver/receiver energy diagrams to analyze the change in energy in systems involving objects changing motion and temperature, and involved in magnetic and gravitational interactions.
4. Students will be able to analyze how children learn concepts of magnetism and energy.
5. Students will be able to develop a 5E lesson plan involving a scientific experiment which involves the identification and manipulation of

variables. Students will be able to link lesson plans to the TEKS and NGSS.

PURPOSE OF CLASS

This class is complementary to IS352. Whereas IS352 covers chemistry related topics, IS351 deals with physical science. The purpose of this can be summarized:

1.To give future elementary and middle school teachers the knowledge and understanding to accurately and comfortably teach science to their students using interesting hands-on activities that reinforce key concepts and the science TEKS.

2. To give you the essential knowledge to pass the science portion of teacher certification exams (TExES).

3. To understand the scientific method, how science is actually carried out in practice, the relation of science to everyday lives, and to develop critical thinking skills useful in *all* aspects of life.

Although this class's primary goal is the teaching of basic science concepts, you will find that activities and learning methods we will use along the way will be useful in your own classrooms. The specific concepts you will study in this class are pitched generally at a middle - high school level; remember, it is essential that you know a subject at a higher level than the students you teach and are able generally to answer science questions that elementary and middle school children are likely to put to you (and they can be quite creative).

It is important to note that even if you are not intending to become a science teacher specifically, it is essential to have a knowledge of basic science in the classroom. Science impacts all areas of life, including those of an elementary or middle school student, and you will inevitably encounter science related questions regardless of what subject you teach. Additionally, the methods of critical thinking that form part of the scientific method can be applied generally to most aspects of life, whether they relate to science or not. Finally, from a practical point of view, you will need to know the material in this course in order to pass the science part of the certification exams.

MY TEACHING PHILOSOPHY

The teaching and learning of science should both be interesting and fun if approached in the right way. Children are natural scientists, in that they are constantly asking questions about how and why things work as they do, and are always attempting their own scientific experiments. Many people report that they lose interest in science during the later years of school (middle and high), citing dull teaching methods and the emphasis on standardized testing that take the life out of the subject. The science is still as interesting as when they were younger, but the joy of thinking and figuring out things for themselves can get squeezed out by the pressure of tests which tend to encourage memorizing over understanding. In this class, critical thinking and analysis will be stressed over rote memorization. I want to make class as an enjoyable an experience for you as possible.

Although this is an online class, discussing the activities with each other and working together to solve problems is an essential part of science. For each module there will be discussion forums that you will be required to post in and engage in meaningful conversation about the activities. I will also be participating actively in the forums, asking questions, challenging your reasoning. These forums should be a supportive environment. I know many of you will be anxious about science as a subject, but one principle to keep upmost in your mind is that *you can only make progress in science by getting things wrong.* The skill of the scientific method is to recognize when things are wrong, and why. This is valuable information that you can use to help progress towards best answer.

Think about doing a puzzle, or playing a video game. You make progress ***only*** by repeatedly going wrong – and thinking about how you went wrong lets you progress further. ***You have all done this!***

The overall aim in this class to make science entertaining and interesting to you, and for you to take that interest and enthusiasm into the classroom to encourage the next generation of children to engage with and participate in science. A science-literate and science-enthusiast society is crucial to the healthy future of our country.

Instructional Methods

This class is being taught using active learning. A good analogy is with a sports coach: you can't learn a sport from sitting in lecture – you learn it by practicing it yourself with a coach present to give you instruction and

feedback. Science is no different – you can only learn by doing. Learning science is not about memorizing facts – it is about learning a skill. And just like in sports, for example, you can't learn skills by someone getting up and lecturing to you. You only acquire skills by practicing them time and again under the guidance of a coach (that's me!).

In an online class it is difficult for you to do hands-on activities. So instead, you will be watching a number of demonstration videos where the activities are carried out, and you will spend your time analyzing them, guided by the worksheets in the class books.

The worksheets in the books you will purchase form the core of the activities, and it is essential you complete them thoroughly. These then act ***as you notes to study for tests.***

There will be very little lecturing: the pedagogical method in this class involves you ***discovering*** the scientific principles yourself through the scientific method rather me just telling you things and you passively listening.

There will be quizzes to test the material you are learning and give you continual feedback, and these will count towards your grade.

Students are expected to participate fully in the discussions with your fellow students in the discussion forums in D2L.

Students are expected to complete their own worksheets in their books thoroughly; these will be the main source of your notes when it comes to studying for finals.

Critical Thinking (Problem Solving) Skills

The methods we use to teach this class are designed to allow you to practice the higher-order thinking skills outlined in yellow below. As such, the methods are a useful pedagogical instruction for you as future teachers. You will also regularly be set teaching and learning activities, in which we will tie the topics you are learning into activities that will help you grow as a teacher.

Bloom's Taxonomy of the Cognitive Domain:

1. **Knowledge** - memorization of facts, words, and symbols
2. **Comprehension** - understanding the meaning of knowledge

3. **Application** - applying concepts to various situations
4. **Analysis** - breaking apart complex ideas
5. **Synthesis** - putting individual ideas together to form a complete explanation
6. **Evaluation** - judging the merits of individual ideas and making decisions

Finding Help

You can email me any time; I will try to respond within 24 hours. There will be two office hours sessions each week on Zoom. But also, the majority of help will come from interacting with myself and your fellow students on the discussion forums.

To succeed in this class

The biggest predictor for success in this (and any) class is the thoroughness, and effort you put into the activities. I haven't checked every class I've ever taught, but I'm pretty sure that every single student that has meaningfully attempted every piece of work has **ever** failed the class, and indeed is likely to do very well. That is a simple aim for you to go into the semester with.

Trust and Responsibility

My teaching philosophy involves trusting student to be responsible for their own learning and the completion of homeworks and other activities. All the work has deadlines, but there will be no penalties for turning work in late, no need for doctor's notes etc. I trust that when you turn work in late, it is because of life outside the class getting in the way, which will always happen at some point. You can turn in assignments any time.

The key thing to understand is this: the more late assignments you turn in, the lower your grade will be just because the activities each week build on the activities the previous week, and the further you slip behind the harder it is to catch up. Students (as you will find when you start in your own classrooms) have a remarkable ability to convince themselves it'll work out, that you can complete a bunch of assignments in a short space of time late in the semester, or you can cram for a test. I know - I did this myself when I was a student! But that rarely works out the way the student thinks it will. I am trusting you with the responsibility to keep on track in the class and turn the majority of assignments in on time.

If life gets in the way for extended periods of time please reach out to me for help. I do everything I can to get students through tough times without it

affecting their grade. Life can be hard sometimes, and I have plenty of experience of that, so I understand.

GRADING

Item	Percentage of Class Grade
Homework extensions (including teaching and learning activities)	25%
Participation in discussion forums	25%
Quizzes	10% (10x1%)
Tests	24% (3x8%)
Lesson Plan Project	16%

Your current grade at any time during the semester can be found in the gradebook in D2L.

Grading scale: (**NOTE:** Grades are not curved in this class – what you get is what you get!)

90 % < A
80 % < B < 89.9999 %
70 % < C < 79.9999 %
60 % < D < 69.9999 %
F < 60%

Assessments

See the course calendar at the end of this syllabus for a list of class, exam, and homework dates (***note: these are estimates – the dates are likely to change – dates will be announced regularly in class and over email***).

In order to pass the course, you must achieve a 65 or higher on at least one exam (first exam, second exam, or final), regardless of your average calculated using the above weighting.

Exams: There will be two midterms and a final. Midterms will be scheduled at least 1.5 weeks in advance. The date will depend on the speed at which material is covered. See the course outline for *approximate* dates. Make-up exams will only be allowed for excused absences. See course policies below for details on excused absences.

Discussion forum contributions: Your effort to learn and your contribution to discussion will determine your grade. This will be assessed through a rubric reproduced below.

Homework: Every homework extension from the Next Gen PET curriculum will be followed by questions to be answered on D2L. Other homework assignments will also be given occasionally. Questions will range from multiple choice questions to free response and reflection questions. Homeworks will be graded individually. Your lowest grade will be dropped.

Quizzes: After each homework extension and certain other homework assignments there will be an online quiz. These will be graded individually.

All discussion, homework and quizzes will be due at Sunday at 11:59pm at the end of the week they are made available.

Lesson plan projects: We will create a "notebook" as a class that covers all of the TEKS for a single grade level. Each student will create two 5E lesson plans during the semester and share them with the class through Google Drive.

HOW TO GET HELP WHEN LIFE GETS IN THE WAY

Life can be hard! You don't need to suffer in silence. There are many ways to get help. If you feel comfortable, I am always ready to hear about any life problems that impact school-work. I myself suffer from depression and anxiety and have needed to ask for help numerous times, and probably will again; it really is worth it.

Mental health issues

- Counseling is available to all students for free.
- Call or drop by in-person to make an appointment
- Halladay Student Serv. #204
- 903-886-5145
- https://tamuc.edu/counseling-center

Student conduct issues

- If you believe a student has violated the code of conduct, you can report it here: bit.ly/TAMUC_Conduct
- Violations of the code of conduct include altercations, disorderly conduct, disruptive activity, discrimination, and sexual harassment

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Student of concern/distress

- If there is a student you are concerned about for reasons such as threatening behavior, talk of suicide, or homelessness, you can report those concerns using the CARE Report Form:
- https://bit.ly/TAMUC_CARE

Concerns about the university

- You can report any concerns you have about the university to The Dean of Students Office:
- McDowell (BA) 296
- The Student Concern forms are
- available at:
- https://bit.ly/TAMUC_Concerns

Title IX: Sexual harassment and assault

If you have experienced or are aware of sexual harassment, sexual misconduct, domestic violence, dating violence, or stalking, you can report this to the Title IX office.

TitleIX@tamuc.edu
McDowell Administration (BA) Building 259
903-468-3104
TitleIX@tamuc.edu

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. If you or someone you know has been harassed or assaulted, you can find the additional resources here:

Campus police: mailto:upd@tamuc.edu, call 911 in emergency situations
SAFE Team: https://www.tamuc.edu/CampusLife/Victim Advocacy and Support/
Crisis center of NorthEast Texas: http://www.ccnetx.org
Know your IX: http://knowyourix.org
End rape on campus: http://endrapeoncampus.org
Clery Center for Security on Campus: http://clerycenter.org
Not Alone: https://www.notalone.gov

Don’t know where to go?

- If you need help and you do not know where to go, Campus Life and Student Success can direct you to the most relevant office.
- Campuslife@tamuc.edu
- Halladay 201
- 903-886-5195
- https://bit.ly/3iNjs5p

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

YouSeeU Virtual Classroom Requirements:
https://support.youseeu.com/hc/en-us/articles/115007031107-Basic-System-Requirements

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**.**

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

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures/Policies

1. You are responsible for knowing when all deadlines are.
2. You are responsible for asking for clarification whenever directions are unclear to you.
3. When emailing the instructor, include the course number in the subject line.
4. You are expected to check D2L for class announcements at least once a day.
5. You are expected to check your email at least once every 48 hours for messages from the instructor. Emails will be sent to the email addresses you provided to MyLeo. Notify the instructor if you would prefer to receive emails at a different address.
6. Homework and exams are due by 11:59 pm on the specified due dates. Late homework will be accepted up to a week late at 50% off. Late exams will not be accepted except in extenuating circumstances.
7. Students are expected to be professional and respectful and follow netiquette.

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

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:

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

Use of AI

Texas A&M University-Commerce acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course.

Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism).

Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors 'guidelines. If no instructions are provided the student should assume that the use of such software is disallowed.

In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

13.99.99.R0.03 Undergraduate Academic Dishonesty
13.99.99.R0.10 Graduate Student Academic Dishonesty

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
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.

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.

COURSE OUTLINE / CALENDAR

This schedule is intended as a rough guide only, and WILL change; all due dates will be announced in class several times and over email.

Date: Week starting…	Topic	Homeworks/Reading/Things to Remember **NOTE: Homeworks due each Sunday at 11:59pm at the end of the week they are assigned**
Aug 26	Introduction to class Magnetism A1 – Mystery tube	NGSS/TEKS refresher/Scavenger Hunt
Sept 2	Magnetism A1 – Mystery tube	Fortune Fish/Process of Science
Sept 9	Magnetism A2 - Exploring magnetic effects	M:EXT A
Sept 16	Magnetism A3 – Developing a model for magnetism	Lesson Plan Assignment #1 M:EXT B
Sept 23	Magnetism A4/A5 – A better model for magnetism	Teaching & Learning Ext.

Sept 30	Magnetism A5 – Explaining Phenomena Involving Magnetism Magnetism A6 - Maglev	M:EXT C
Oct 7	**Midterm 1** Teaching & Learning	Lesson Plan Assignment #2 Teaching & Learning Ext
Oct 14	Interactions & Motion A1	IM:EXT A
Oct 21	Interactions & Motion A2 – Motion and Energy Slowing and Stopping	Ext B
Oct 28	Interactions & Motion A3/A4 A5 – Warming and Cooling	EXT D,E,G
Nov 4	Interactions & Motion A5 – Electric Circuits More keeping track of energy	Lesson Plan Assignment #3
Nov 11	**Midterm 2** Interactions & Motion A7 – Conservation of Energy	EXT I
Nov 18	Interactions & Motion L1 – Elastic Objects and Energy	EXT A,B
Nov 25	**Thanksgiving**	
Dec 2	Interactions & Motion L4 – Gravitational interactions & Energy	Lesson Plans: Due EXT D
Dec 9	**FINAL**	