Essl 290 F 2021

Lecture 1

Intro: * Instructor introduction

* Attendance

* Ask students to introduce themselves to me.

Timekeeping

This course is about how and why we measure and keep time. Time seems intuitive but the business by which it is measured and used is much more involved than it may seem. It also has a long and convoluted history. To give an idea consider the following questions:

* Ask class questions and how difficult they are to answer.

Question	Difficulty answering (scale 1→5) ↗ easy ↖ difficult
1) What time is it now?	
2) How do you know what time it is?	
3) How can you be sure?	
4) What time does the next class in this room start?	
5) ~~How do you tell the time?~~	

Instances of time

Duration of time

Question	Difficulty answering scale (1->5)
1) How long does a class meeting last? 2) How much time left until the end of this class? How would we measure? 3) How long should each class meeting last in an optimal situation?	

1) How do you tell the time?

2) How does your timekeeper work? How do you know it is accurate.

We are all accustomed to thinking about such questions. But is everyone? Are they so obvious?

We could consider asking such questions to children. At what age would children be able to answer such questions?

We could go back in time in European history and imagine discussing these questions. The results are that they would not be obvious to most respondents, say 1500 years ago.

The way in which such questions is related to the type of technology that we have to measure and keep time. This course will be about:

1) how the technology and science of timekeeping has evolved in the western world from the time of the ancient Egyptians / Greeks / Romans until present.

2) why the technology has evolved this way. What demands from society have driven this evolution.

3) how the technology has affected the way we perceive time and how it has affected our lives.

Precision + Accuracy

One of the themes that will emerge is increasing precision and increasing complication of timekeeping devices. For example

* earlier ⇝ sundial ⇝ easy to understand ⇝ limited precision

* later ⇝ atomic clock ⇝ requires sophisticated physics
⇝ extreme precision. lose 1s in 300,000,000 years.

- show image of NIST F-1 clock.

Why do we need such increasing precision at such expense?

Question for class:

1) What is the most precise timing you have used (that you are aware of)?

   What were the circumstances?

   Why did you need such precision?

2) What is the least precise timing that you have used?

   What were the circumstances?

   Was the timing accurate enough?

Some situations that require precise timing are:

1) timed races in sports

   - video Bobsleigh races minute 1:50-D 2:27

2) finding locations

3) timing in electronics.

Describing the precision of devices will require:

1) mathematics at the level of Math 110

2) elementary ideas from physics that will be covered in class.

Cowse background needed:

1) most gen-ed, especially ENGL 111/112
2) some math ~ multiply, add, divide, ...
3) NO PHYSICS.

Cowse structwe

— Websites

* Attendence required / discussion encouraged.
* Texts ~ read in advance Mondschein p 1 → 14. for Weds.
* Assignments – weekly exercises First due 30 Aug.
  – two research papers
  – term paper
* Grades – see syllabus.

My Interest

* Background as a physicist. Need precise timing in physics experiments. We develop ways of improving precision in timekeeping.
* Recent developments use quantum physics
* Historical + social aspects interesting.

Goals for Students

Learn that something as seemingly mundane as time has an interesting story!!