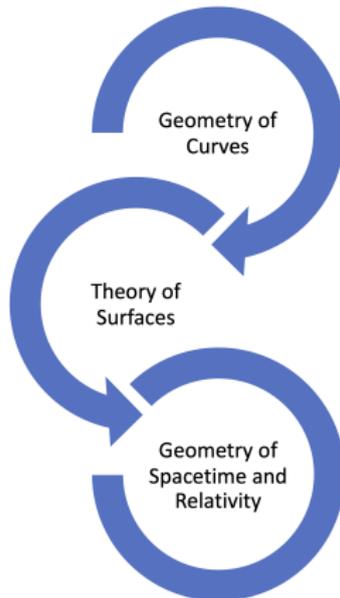


Welcome to Differential Geometry!

Adapted from artist's rendering of S0-2 and supermassive black hole by Nicolle Fuller/National Science Foundation





Try it Out!

readings
interactive videos

Understand
Misconceptions & Apply

re-engage activities
review my feedback

Solidify and Make
Connections

in-class assessments
projects

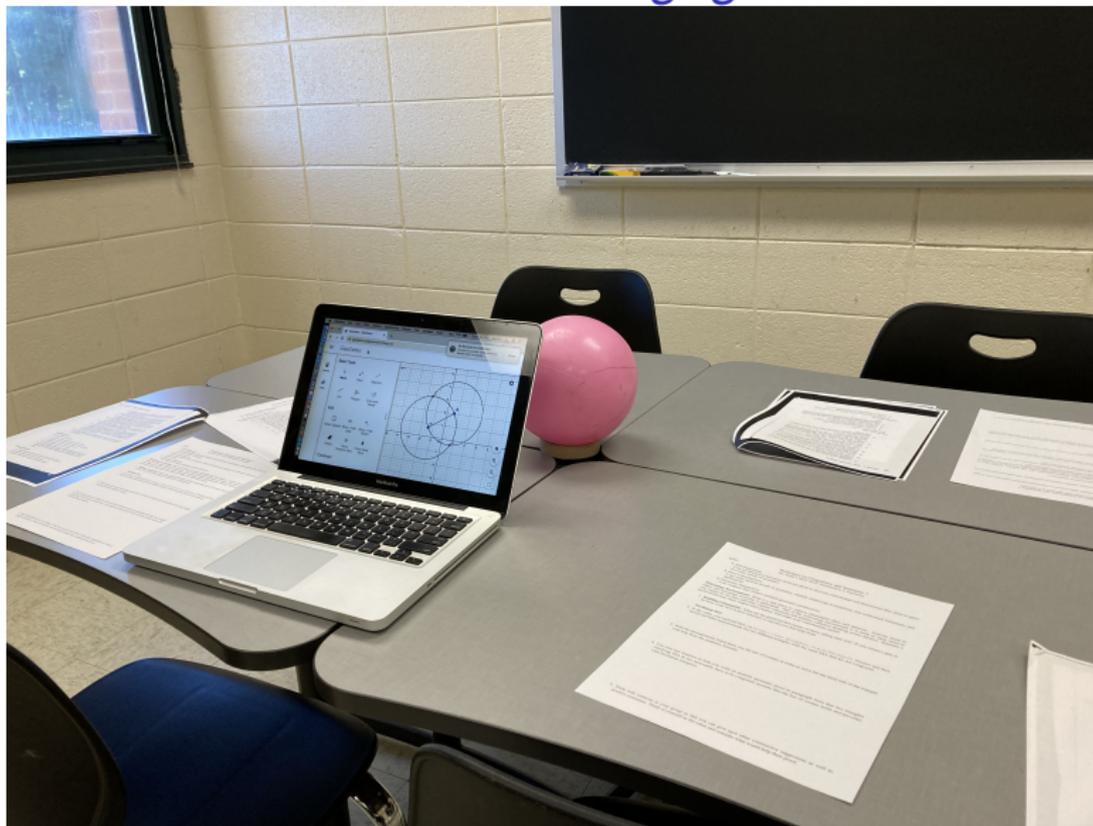
Making mistakes is integral to the learning process and enriches our understanding as we extend content and clear up misconceptions.

Dr. Sarah's Differential Geometry Tentative Calendar

While some items have strict deadlines, there is still flexibility built in and multiple pathways for success—videos have multiple chances to succeed and projects can be completed ahead plus there is a revision opportunity for one of the first three projects and one in-class assessment. Attempt readings and videos for completion and take video notes by the listed date and complete re-engages when possible as the material builds on itself. Some days are lighter than others and it will help you to progress on upcoming activities in advance, especially major assignments.

	Class Monday	Between Classes (by just before 3pm Wed.)	Class Wednesday	Between Classes (by just before 3pm Monday)
1/17		obtain rental book from bookstore	review 2130	-class intro interactive video -read "Curves" -read 1.1 pp. 1-7 -lines and Maple intro interactive video -download or access Maple -re-engage 1
1/22- 1/24	curvature osculating circle parabola and line	-read 1.1 pp. 8-14 -tractrix interactive video -add ASULearn profile pic -Zoom update & profile pic -get to know posting -read the syllabus	arc length and speed comparing and contrasting curves	-read 1.2 pp. 14-17 - s , T and physical attributes interactive video -practice submitting PDF -re-engage 2
1/29- 1/31	s , T , velocity, speed, acceleration, jerk helix computations	-read 1.3 pp. 17-19 -TNB 1 interactive video -choice of curve for Project 1	TNB curve of Archytas cycloid and spiral	-read "How Flies Fly" -read 1.3 pp. 19-20 -TNB 2 interactive video -re-engage 3
2/5- 2/7	TNB spherical epitrochoid matching activity	-read 1.3 21-25 -curvature and torsion implications 1 interactive video	curvature and torsion Darboux vector fundamental theorem of space curves	-Project 1: research, investigate and present a curve -re-engage 4
2/12- 2/14	Project 1 presentations	-read 1.5 pp. 34-35 -curvature and torsion impli-	curvature and torsion helix and strake	-prepare for in-class curves assessment

Effective Class Engagement



Where Did Our Third Hour Go?



- rolled into the between class time on activities!

Effective ASULearn Engagement

H-P

course intro interactive video

✓ **Done:** Receive a grade

✗ **Failed:** Receive a passing grade



read curves by Doğan Çömez, myself and Jill Thomley 🌍

Mark as done



read 1.1 pp. 1-7 🌍

Mark as done

H-P

lines and Maple intro interactive video

To do: Receive a grade

To do: Receive a passing grade

Effective ASULearn Engagement

(optional) Paul's Online N...

- course intro interactive vi...
- read curves by Doğan Çö...
- read 1.1 pp. 1-7
- lines and Maple intro inter...
- download or access Mapl...
- re-engage 1
- read 1.1 pp. 8-14
- tractrix interactive video
- add ASULearn profile pict...
- update Zoom to the latest...
- send me posting in the ne...
- read the syllabus
- read 1.2 pp. 14-17
- arc length, tangent, veloci...
- practice submitting PDF o...



course intro interactive video

✓ Done: Receive a grade

✓ Done: Receive a passing grade



read curves by Doğan Çömez, myself and Jill Thomley

✓ Done



read 1.1 pp. 1-7

✓ Done



lines and Maple intro interactive video

✓ Done: Receive a grade

✓ Done: Receive a passing grade



download or access Maple (free) and open the program

✓ Done



re-engage 1

Available from **January 17 2024, 3:45 PM**



Interactive Videos, Repeatable

interactive video activities, repeatable

Pause regularly to take notes that you can bring with you to class especially on concepts, proofs, Maple, and other visualizations, and any remaining questions.

★ 11 Question(s) answered

You have answered 11 questions, click below to submit your answers.

 Submit Answers

Answered questions

	Score
0:26 line connecting points $(-3,2,5)$ and $(1,-2,4)$	1 / 1
1:08 A line has	1 / 1
2:15 Why is a line the shortest distance path connecting two p...	1 / 1
2:49 dot product of two vectors in 3-space	1 / 1
3:15 To calculate a tangent vector and the velocity vector	1 / 1
3:53 arc length	1 / 1



need help from me, your classmates, or tech support?

in-class items, video slides and more

Dr. Sarah's Announcements

t-shirt Wed

- course intro interactive video [slides](#) [interactions](#)
- read curves article
- read 1.1 pp. 1-7
- lines and Maple intro interactive video [slides](#) [Maple](#) [interactions](#)
- download or access Maple and open the program
- re-engage 1
- class: [curvature](#) [slides](#)

- obtain rental book from the bookstore
- class: [in-class and between classes](#), [2130 review and handout](#)
[\(optional\) Paul's Online Notes: Calc III](#)

differential geometry lines and Maple intro interactive video

I

$$x = a(2\sin t - \sin 2t)$$

$$y = a(2\cos t - \cos 2t)$$

PARAMETRIC EQUATIONS

https://www.cafepress.com/+parametric_equations_postcards_package_of_8_790199315

with(Student[VectorCalculus]

```
TNFrame(<2*sin(t)-sin(2*t), 2*cos(t)-cos(2*t), 0>,
range=0..3*Pi, output=animation,
scaling=constrained, axes=frame, frames=50);
```

Dr. Sarah Differential Geometry

Watch later Share

YouTube



Projects

Project 1: Research, Investigate, and Present a Curve

You may work alone or with one other person and turn in one per group to one of your ASULearns. Curves are on a **first come-first-served** basis in the ASULearn choice selection feature.

Explore the following questions via the sources and Maple file I provided for you as well as researching and analyzing yourself. (**Keep track of ALL references for # 15**). **Write it up in your own words in the language of our class** but you may use pictures from elsewhere (with proper reference).

You will turn in all of the following and share with your classmates (see #17).

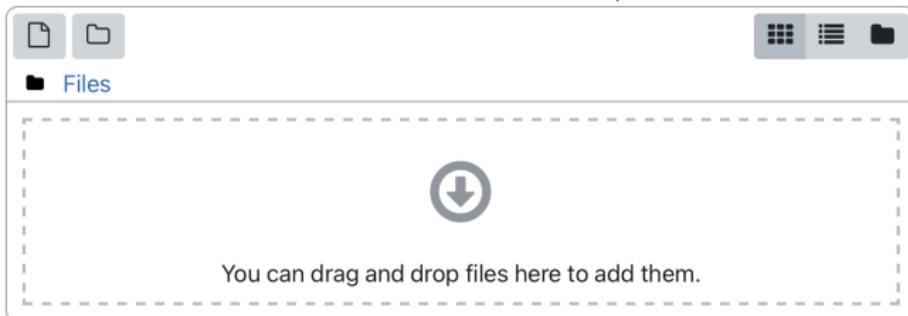
1. List your preferred first name(s). If you are turning this in with a partner, list both names.
2. Search an image database for “differential geometry of *”, where * is a name of your curve that you selected in the choice feature on ASULearn. You might use Google images, for instance. Provide one or more interesting images that relate. Be sure to list any picture references (and any other references) in #15. Google is a database, not typically the original source of an image, so be sure to track back to the original source.
3. Handwrite or professionally typeset general formulas for the following entities as a review in equations and/or words. Assume that you have a curve parametrized in time. Do NOT do any calculations for your specific curve here, but do show generic formulas connected to the language of our class and/or explain how to calculate each from a parameterization of the curve $\alpha(t)$ itself. Your answers may build upon one another, i.e. using part (a) in another part.

Project Submit as PDF

✓ Add submission

File submissions

Maximum file size: 800 MB, maximum number of files: 1



Accepted file types:

PDF document .pdf

Save changes

Cancel

Project Feedback File—Keep Scrolling!

File submissions	 project1s24.pdf December 4 2023, 8:50 PM
Submission comments	▶ Comments (0)

Feedback

Grade	see grade and feedback in the file (keep scrolling!)
Graded on	Monday, December 4, 2023, 8:51 PM
Graded by	 Sarah Greenwald
Feedback files	 Sarah Greenwald greenwaldsj_2494108_assignsubmission_file_project1s24.pdf December 4 2023, 8:51 PM

Timed In-Class Assessments

In-class Timed Assessment: Curves

It is time for our first in-class assessment, on curves, in order to be sure that everyone reviews some of the fundamental concepts before we move on to surfaces.

During Class

- You may make yourself some reference notes on both sides of the very small card I hand out. The mini-reference card must be handwritten. Think of the card as a way to include some important concepts, computations, or derivations that you aren't as comfortable with. You won't have room for much, so you should try to internalize as much as you can.
- You may have standalone ear plugs—no technological connections connected to the internet though.
- This assessment has an individual component as well as a component where you can work in groups.

You work alone until I collect the individual portion and say it is “group time” and time to turn in the individual portion. Then you may continue to work alone or in groups (or a combination!). The idea is to give you opportunities to communicate course content with your peers, since this is one of ASU's main educational goals: “Successful communicators interact effectively with people of both similar and different experiences and values.” The only guidelines are that each person must eventually write up and turn in their own, the only resources you are allowed to use is each other, and you should spend the time inside the classroom effectively engaging.

If you finish the individual component early, proceed with the group component on your own until I announce group time—the idea is to have silence for a good portion of class before we switch to “group time.” If you finish the entire assessment early, then you may leave early.

- Your grade will be based on the quality and depth of your responses in the timed environments. Partial credit will be given, so (if you have time) showing your reasoning or thoughts on questions you are unsure of can help your grade.

Review Suggestions

Be sure you could respond to questions on these. I want you to understand the material and I am happy to help!

Short Derivations/Proofs Be able to prove the following in the language of our class:

- Prove the derivative of a unit vector \vec{u} is perpendicular to the original vector if neither are $\vec{0}$.





choice of curve for project 1

To do: Make a choice



read 1.5 pp. 34-35 🎨

✓ Done



curvature and torsion implications 2 interactive video

✓ **Done:** Receive a grade

✓ **Done:** Receive a passing grade



begin curves assessment guide

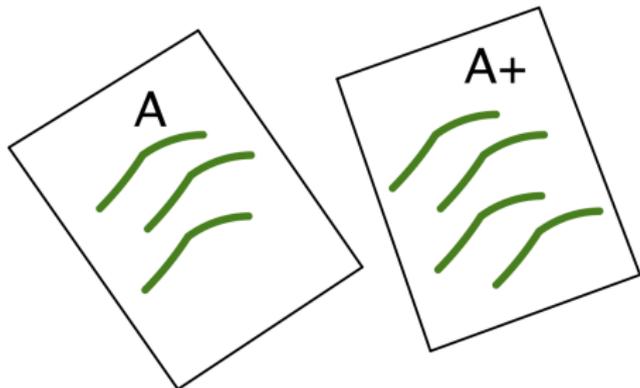
To do: Submit feedback



<https://mathequalslove.blogspot.com/p/free-classroom-posters.html>
<https://www.leaderinme.org/blog/the-power-of-a-growth-mindset/>

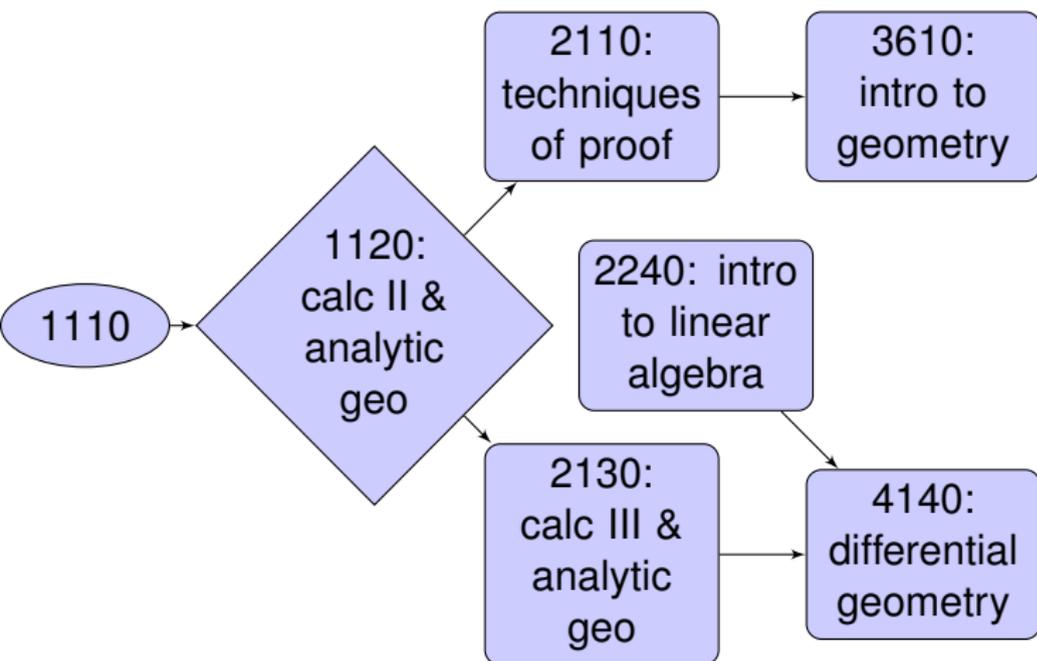
Grades

- Effective Class Engagement 10%
- Effective ASULearn Engagement 30%
- Projects 40%
- In-class Assessments 20%



$A \geq 93$; $90 \leq A- < 93$; $87 \leq B+ < 90$...

Geometry in the Mathematics Major at Appalachian



Where to Get Help!

- Required class meetings and optional e-Z check-in
- need help from me, your classmates, or tech support forum



FORUM

need help from me, your classmates, or tech support?

- use my instant feedback and later feedback to help you learn **keep scrolling down**
- library RAP

I care about you and your success!



<http://alangregerman.typepad.com/.a/6a00d83516c0ad53ef0168e783575e970c-800wi>

