

Fall 2020  
MATH 60330 “Basic Geometry and Topology”  
MWF 11:40am–12:30pm, Hayes-Healy 117  
Pavel Mnev

**Topics.**

The course will cover the following related topics:

- (1) Point set topology – a rapid introduction.
- (2) Fundamental group and covering spaces.
- (3) Smooth manifolds and vector bundles.

Topological topics (1), (2) will constitute roughly the first half of the course and the geometrical topic (3) the second half.

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**Exams.** There will be one midterm exam and the final exam. The dates will be known later. Both exams will be conducted in take-home format.

**Homework.** Homework will be assigned every Friday via Sakai/Assignments and will be due back next Friday (also to be returned via Sakai). Collaboration when working on home assignments is allowed and encouraged, but each student should write their solutions independently. Late homework is not accepted.

**Quizzes.** We will have short quizzes in the beginning of the class every 1-2 weeks, testing basic understanding of definitions and theorems.

**Grades.** Grades will be based on a total of 450 points, distributed as follows:

- Midterm exam – 100 points;
- Final exam – 150 points;
- Quizzes – 100 points;
- Homework – 100 points.

**Office hours.** Office hours will be held via Zoom on Wednesday 5-6pm, or by appointment (to set up, write to me at [pmnev@nd.edu](mailto:pmnev@nd.edu)).

Zoom meeting ID: 956 2604 7322; password:  $\pi_1 S^1 = Z$

**For students who have to attend remotely:** classes will be conducted in “dual mode.”<sup>1</sup> You can join in using the same Zoom ID as above for live remote participation and/or watch lecture recordings later (they will be hosted in Panopto).

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**Pandemic-related.**

- Please wear your face mask when attending the class.
- Please observe 6ft social distancing at all times in the class and when entering or leaving the classroom.

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<sup>1</sup>But if it makes more sense, we might switch to just recording the classes.

### References.

I will be drawing from several sources. Here are some useful references.

- i Lecture notes by Stephan Stolz:  
[https://www3.nd.edu/~stolz/2019F\\_Math60330/Basic\\_Geo\\_Top\\_2019.pdf](https://www3.nd.edu/~stolz/2019F_Math60330/Basic_Geo_Top_2019.pdf)
- ii Lecture notes by Andy Putman linked to here:  
<https://www3.nd.edu/~andyp/teaching/2016FallMath60330/>
- iii Reference for point set topology: James R. Munkres “Topology: a first course,” Prentice-Hall, 1974. Lecture notes following the book:  
<http://folk.uio.no/rognes/kurs/mat4500h10/topology.pdf>
- iv Fundamental group and covering spaces: chapter 1 in Allen Hatcher’s “Algebraic topology,” Cambridge University Press, 2002. Available freely at  
<https://pi.math.cornell.edu/~hatcher/AT/AT.pdf>
- v John M. Lee, “Introduction to smooth manifolds,” Springer, New York, NY, 2013. Available freely via the publisher:  
<https://link.springer.com/content/pdf/10.1007%2F978-1-4419-9982-5.pdf>
- vi Frank W. Warner, “Foundations of differentiable manifolds and Lie groups.” Vol. 94. Springer Science & Business Media, 2013.
- vii Lectures on differentiable manifolds by N. Hitchin:  
[https://courses.maths.ox.ac.uk/node/view\\_material/253](https://courses.maths.ox.ac.uk/node/view_material/253)
- viii John Milnor, “Topology from the differentiable viewpoint,” 1965:  
<http://www.ux1.eiu.edu/~cfcid/Classes/4855%20and%205220/Supplementary%20Texts/MilnorTopDiffVpt.pdf>
- ix Lectures on topology by Denis Auroux: [http://people.math.harvard.edu/~auroux/131f19/Math\\_131\\_Notes\\_Beckham\\_Myers.pdf](http://people.math.harvard.edu/~auroux/131f19/Math_131_Notes_Beckham_Myers.pdf)
- x Victor Guillemin, Alan Pollack, “Differential topology,” Vol. 370. AMS, 2010.  
<http://math.ucr.edu/~res/math260s10/old/difftopGP.pdf>