

Advanced Topics in History of Mathematics and Mathematics Education
Course Outline
Course 8996019 Section 01, Fall 2022
Mondays 18:00 - 20:50, Room: E1-1 #116
Chungbuk National University

Instructor: Dr. Byungdo Park

Email: byungdo@g.cbnu.ac.kr

Office hours: Mondays 20:50 - 21:50.

Class webpage: Announcements, homework, exam schedules and other relevant information will be posted on the following webpage: https://byungdo.github.io/teaching/f2022_athmme.html which is also accessible via instructor's webpage: <https://byungdo.github.io/>

Textbook:

- Hans Freudenthal, *Mathematics as an Educational Task*, 1st Edition (1973), D. Reidel Publishing Company, ISBN-13: 9789027703224.

References:

- 우정호, *학교수학의 교육적 기초 - 중, 개정판*(2017), 서울대학교출판문화원, ISBN-13: 9788952118813
- John Stillwell, *Mathematics and Its History* (Undergraduate Texts in Mathematics), 3rd edition (2010), Springer-Verlag Berlin, ISBN-13: 9781441960528
- E. T. Bell, *Men of Mathematics*, reprint edition (2008), Touchstone, ISBN-13: 9781416597612

Course description: This is a topics course on history of mathematics and mathematics education. Our goal in this semester is geometry education. We shall carefully read chapters of Freudenthal's classic including "Chapter XVI. The Case of Geometry" and cast a light in the perspective of modern geometry.

Course objectives: At the end of the course students should be able to:

- Understand Freudenthal's perspectives in teaching geometry.

Details on class proceeding: The class will run by discussion in all meetings. The instructor will lecture on Freudenthal's text and ask questions so that students can think about it and possibly use some of them as problems for their thesis.

Grading policies: Final exam (essay) 92% assessed at the sole discretion of the instructor and 8% attendance.

Attendance policies: (1) Attendance data will be collected in every class meeting and will be used for determining your final grade. You will get a grade F if you have missed more than 25%

of class meeting hours. Up to 3 hour of absence there is no penalty on your score. After that, you lose 1% of total score for an absence to each 50-minute long class meeting, with a maximum total loss 8% from your total score.

(2) If you have permissible reasons for your absence in accordance with the Regulation on Academic Management of the CBNU Article 52(1) (충북대학교 학사운영규정 제52조(공결승인) 제1항), you will need to contact your department secretary to follow the procedure for getting an approval on your absence bringing proper documentation as proof. That said, you have to fill out a form and submit it along with appropriate proofs before the absence or after seven days of the date of absence.

(3) Any dispute about in-class attendance records must be made before the instructor physically leaves the classroom after that day's class meeting. If your attendance call is responded by a person other than you, a penal responsibility will be pursued against responsible individuals.

Assessment of learning: The assessment will be primarily done by the abovementioned grading policy. Nonetheless, the instructor will also take into account students' devotions and efforts for this course as well as their enthusiasm as a future educator so that those qualitative elements are not going to be neglected.

Important dates:

- Monday October 12th – Chuseok holiday observed. Make-up date: TBA
- Monday October 3th – National foundation day. Make-up date: TBA
- Monday October 10th – Hangeul proclamation day observed. Make-up date: TBA

Weekly lesson plan:

Week 1: Going-over the syllabus, the mathematical tradition (Chapter 1)

Week 2: Mathematics today – What is today? The change of style (variables, functions, anacolutha) (Chapter 2)

Week 3: The change of style (A dog is if it barks, the business of formalizing), the extensional abstraction (Chapter 2)

Week 4: The axiomatic abstraction, What happened to geometry? Conceptual and algorithmic mathematics, organizing and mathematizing, the applications (Chapter 2)

Week 5: Introduction, What is geometry? Why geometry instruction? (Chapter 5)

Week 6: Concrete material, Dina Van Hiele's experiments, P. J. Van Albada's course (Chapter 5)

Week 7: Fitting, deduction, Euclid's deductivity, Towards linear algebra (Chapter 5)

Week 8: Towards the vector space of linear algebra, towards the inner product, the angle concept of vector space (Chapter 5)

Week 9: Revision of the angle concept of vector space, linear algebra as geometry, “saving geometry” by axiomatics (Chapter 5)

Week 10: Axiomatics of geometry in teaching, axiomatics and traditional deductivity, local organization – the perpendicular bisectors (Chapter 5)

Week 11: Local organization – stereographic projection, organizing a field – the ideas of orientation, organizing a field – cyclic orientation (Chapter 5)

Week 12: Organizing a field – the angle concepts (Chapter 5)

Week 13: Groups in geometry. Critical analysis (Chapter 5)

Week 14: What is a structure, the didactics of the congruence group, geometric axiomatics by group theory (Chapter 5)

Week 15: Leeway for catch-up, final exam

Accommodating disabilities in learning and assessment: The instructor is committed to providing access to all students. If you need accommodation in classroom or in assessment, you are encouraged to set up an appointment with the instructor at your soonest availability so that we can figure out the best way to accommodate you. Possible accommodations include, but not limited to, provision of materials from lectures, permission to hire an assistant for taking notes, audio-recording lectures, and aid/assistant devices, extension of due dates for assignments, alternative assessment for in-class presentations, extension of exam hours, and provision of an accommodating exam locations and exam sheets.