

Introduction to Geometry
Course Outline
Course 7412645 Section 01, Spring 2023
Wednesdays 14:00 - 14:50, Thursdays 13:00 - 14:50, Room: E1-2 #306
Chungbuk National University

*This document prevails whenever interpretations of the course syllabus (the version in **개신누리**) and that of this document conflict. This document contains terms and conditions on how this class will be administered throughout the semester. Registering for this class means you agree on plans, policies, and details in this document. You **MUST** drop this course if you disagree with any item listed in this document.*

Instructor: Dr. Byungdo Park

Email: byungdo@chungbuk.ac.kr (alternatively, use byungdopark1@gmail.com if it does not work)

Office hours: Tuesdays 18:00–18:50 at E1-1 #110 or by appointment.

Class webpage: Announcements, homework, exam schedules and other relevant information will be posted on the following webpage: https://byungdo.github.io/teaching/s2023_introgeom.html which is also accessible via instructor's webpage: <https://byungdo.github.io/>

Textbook:

- Israel M. Gelfand and Tatiana Alekseyevskaya (Gelfand), Geometry 1st Edition (2020), Birkhäuser, ISBN-13: 9781071602973

References: None. Just read the main textbook multiple times if you don't get it.

Prerequisites: None. All are welcome.

Course description: This is an introductory course on geometry as well as the first serious mathematics major course for freshmen. While covering topics in geometry we shall kindly assist students to acquire necessary familiarity to undergraduate-level mathematics including the necessary reading comprehension of English-based mathematics texts. In this semester, we shall take the geometry textbook of I. M. Gelfand and T. Alekseyevskaya to explore projective, affine, and Euclidean geometries as well as symplectic geometry if time permits. We will be able to appreciate how Gelfand builds up ideas starting from the very elementary level.

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

- Understand basic elements of projective, affine, Euclidean, and symplectic geometry.
- Conceive geometry as means of recognizing shapes and physical spaces as opposed to a logical system consisting of propositions and proofs.

- Appreciate Gelfand’s pedagogical excellence and geometric intuitions in introducing new concepts.
- Shape an idea about how to teach geometry to secondary level students.

Details on class proceeding: The instructor will give lectures on the material following the weekly lesson plan and assign weekly homework problems. He will also encourage you to participate in a Project-Based Learning to strengthen your competence as a teacher also in online, remote setup.

Grading policies: 40% from midterm exam, 40% from final exam, 12% from homework, and 8% from attendance. Up to an additional 3% total score credit for your PBL project. Absolute evaluation [A: 100–90 points, B: 89.99–80 points, C: 79.99–70 points, D: 69.99–60 points, F: less than 60 points] with curving. Here the curving means a horizontal shift of the bell-shaped curve of %-score distribution in either directions using a rational constant which is determined at the discretion of the instructor. The only exception (that is unlikely to happen) to the absolute evaluation: If your total score is less than 60 points after curving and greater than or equal to 60 points before curving, then D is assigned instead of F. Grading policies in the attendance policies, academic integrity policies, and classroom attitude policies are applied in higher priority (in this order) than the above grading policies. Those who are in their final semester and have to show up to work during the semester, special rules apply in accordance with the university policies (cf. 충북대학교 학칙 제34조의2, 학사운영규정 제86조의3).

Homework policies: Your homework is doing every “PROBLEM” in the textbook.

- Every homework is due by beginning of the upcoming Wednesday’s class. That said, your due dates are: March 08, 15, 22, 29, April 05, 12, 19, 26, May 03, 10, 17, 24, 31, June 07. Total 14 homework.
- Late homework will **NOT** be accepted.
- You don’t have to copy the statement of the problem.
- Your answers must be in complete and logical sentences.
- Submit your homework in hardcopy and must be hand-written. Use of iPad or a tablet PC are not allowed.
- Do not use the cover sheet and do not staple. At the every top-right corner, just write your name, ID number (only if there is someone with the same name), and p/n where p is the current number of sheets and n is the total number of sheets.
- Do make it one-sided, as it will be scanned for records.
- Your homework will not be returned. Scan it or take a photo before submitting it.

Classroom attitude policies: The instructor may apply up to 5 points per day (up to 10 points per day for repeated cases) of deduction of your total score against any of your attitude which the

instructor views it inappropriate. The sum of total score deduction due to these policies may not exceed 20 points throughout the semester. Inappropriate attitudes are (i) anything you do in the classroom that disturbs and/or distracts the instructor or other students or (ii) disturbing and/or distracting the instructor from administering this class. If you violate, you will be notified via email registered in **개신누리** and it gets confirmed if you do not dispute in a written form in 7 days.

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) If you responded to an attendance call and leave the classroom (even if you come back later) while the lecture is still going on, you will be considered to be absent for that attendance call *if you report later to the instructor that you left during the class within that day's class*. If you don't report and your arbitrary and sudden leave gets caught, you will be considered to be absent for that day's class and it will be treated as a violation of classroom attitude policies.

(4) Any dispute about in-class attendance records must be made before the instructor physically leaves the classroom after that day's class meeting.

Assessment of Project-Based Learning (PBL): To submit your PBL project for an extra credit, you should record a 20-minute long video lecture about one of the following:

- A sample lecture on any topic listed on the syllabus of this course.
- A sample lecture on a concept from secondary school geometry curricular.

You should submit the video in a form of a YouTube video link by choosing the sharing option “unlisted(일부공개).” Your video will be disclosed to your classmates in this course as a part of a YouTube playlist. Registering to this course would mean that you accept sharing your video lecture with your classmates via YouTube. You may turn your video into “private” or even delete the video after your letter grade for this course is assigned. The assessment will be done as follows: 3/3 all in all good work. 2/3 lacking important examples, theorem, proofs or there are significant mathematical errors. 1/3 overall poor contents of the material. 0/3 no hand-in or a reuse of recording submitted to the instructor in the past.

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:

- None

Weekly lesson plan:

Week 1: Points and lines, two lines and an angle, three lines (Sections 1.1–1.3)

Week 2: Four lines. Quadrilaterals, five lines, projection from a point onto a line, dual configurations in projective geometry (Sections 1.4–1.7)

Week 3: Desargues configuration, dual Desargues configuration, algebraic notation of “computer presentation” of configurations, polygons and n straight lines, convex polygons, convex hull of n points, solution of Exercise 3 with the help of a Desargues configuration (Sections 1.8–1.14)

Week 4: Parallel Straight Lines, operations available in Chapter II, properties of parallel lines, segments lying on parallel lines, parallelograms, triangles (Sections 2.1–2.6)

Week 5: Trapezoids, the Minkowsky addition of two figures, parallel projection, parallel translation (Sections 2.7–2.10)

Week 6: Central symmetry on the plane, vectors (Sections 2.11–2.13)

Week 7: Operations available in Chapter IV, comparing segments, angles, operations with figures (Sections 4.1–4.4)

Week 8: Leeway. 100-minute midterm exam.

Week 9: Elements of triangle. Congruent triangles, construction of a triangle from its elements, relations between elements of a triangle, properties of a triangle. Particular kinds of triangles, area in Euclidean geometry (Sections 4.5–4.9)

Week 10: The Pythagorean theorem and its applications, relations between lines and points, special lines and special points in a triangle (Sections 4.10–4.12)

Week 11: Polygons, summary of facts about different quadrilaterals, similarity (Sections 4.13–4.15)

Week 12: Circles and points, circles and lines, two or more circles, circles and angles (Sections 4.16–4.19)

Week 13: A circle and a triangle, circles and polygons (Sections 4.20–4.21)

Week 14: Circumference and arc, disks and sectors (Sections 4.22–4.24)

Week 15: Leeway. 100-minute final exam.

Dispute policies: (1) You may set up an appointment with the instructor to get information about the raw data (such as your exam scores, attendance data, etc) which will consist of your total score. For that, you have to send an email to the instructor to set up an appointment. Typically the meeting will take place during the office hour (you cannot walk-in for this purpose; set up an appointment first) but if you have a class at the same time, you should attach your time table showing that you have another class during the office hour.

(2) If you do not set up an appointment and do not dispute about the raw data, the instructor will have to assume that you give up your right to dispute. After the final exam, the instructor will announce the last day for dispute. After this date, the instructor will only look into whether there is any error in entering your final grade and will dismiss all inquiries on the raw data.

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.

Academic integrity: It is expected that you will complete all exams without giving or receiving help from anyone. Electronic devices are not allowed in any in-class exam. If you violate any of these policies, you receive score zero to that exam at the discretion of the instructor. In addition, your case will be handled through the standard procedure of the university. Note that a use of your smartphone during an exam is simply a cheating.

Email policies: All emails addressed to the instructor should have a title containing the course title, name, and a brief summary as well as a body starting with "Dear Professor Last name" and ending with "Sincerely, Your full name", which contains greetings, your name and department, a brief and clear purpose written politely. Any email deviating from this format will not be accepted and will be dismissed without any rejection reply. The corresponding disadvantages are solely and entirely on the student.

이메일 작성규칙: 담당교수에게 보내지는 모든 이메일의 제목에는 과목명, 신원, 요지가 포함되어 있어야 하며, 본문은 반드시 "OOO 교수님께"로 시작하여 인사, 신원, 용건을 간단 명료하고 예의 바르게 기술한 후 "OOO 올림" 또는 "OOO 드림"으로 끝나야 합니다. 이 형식에 어긋난 이메일은 접수하지 않으며, 반려회신 없이 종결합니다. 이에 따른 불이익은 전적으로 학생의 단독 책임입니다.

English usage policies: Lectures in this course will be given in Korean, but most of written materials will be in English. For example, the course syllabus, most of boardwork, exam problems, homework, solutions to exams, course webpage, announcements, but not limited to those. English sentences to be used in this course should be understandable enough based on the regular Korean public high school curriculum. Nonetheless if your English skill is not competent enough to follow

this course or understanding announcements, it is your responsibility to ask the instructor to also provide an explanation in Korean. The instructor will take those questions under an attitude of helping students' understanding, but taking into account the contents of each question, he may reject the question or advise the questioner to visit him during his office hour to ask the question about Korean translation.

영어 사용 정책: 본 강좌에서 강의는 한국어로 이루어집니다만, 글의 경우 대부분 영어가 사용될 것입니다. 수업계획서, 칠판 판서의 대부분, 시험문제, 숙제, 시험문제에 대한 풀이, 강좌의 웹페이지, 공지사항 등이 예가 될 수 있으며, 이상 열거한 것들로 한정되지 않습니다. 본 강좌에서 사용될 영어 문장들은 한국의 공립 고등학교 정규 교과과정을 기초로 할 때 충분히 이해될 수 있어야 합니다만, 만약 수강생 본인의 영어실력이 본 강좌를 따라오거나 공지사항을 이해하기에 충분치 못하다면, 담당 교수에게 한국어로 추가 설명을 요청하는 것은 학생 본인의 몫입니다. 담당 교수는 학생들의 이해를 도우려는 자세로 질문을 받을 것이지만, 질문의 내용에 따라 답을 하지 아니할 수도 있고, 면담시간에 개별 방문하여 질문하도록 안내할 수도 있습니다.