GEN024 N1 Mathematical Methods in Science

Schedule

DATE	TITLE	NOTE
December 6	1. Introduction	About This Course, Research Test
December 8	2. Sets and Logic	Truth Table
December 11	3. Symbolic Logic	Universal and Existential Propositions
December 13	4. Summary	Quiz 1: Sets and Logic
December 15	5. System of Linear Equations	Augmented Matrix, Elementary Row Operations
December 18	6. Solution Set	Reduced Row Echelon Form
December 20	7. Summary	Quiz 2: System of Linear Equations
December 22	8. Operations of Matrices	Coefficient Matrix, Product of Matrices
January 10	9. Inverse of a Matrix	Elementary Matrices, Invertible Matrix Theorem
January 12	10. Applications	TBA
January 15	11. Summary	Quiz 3: Matrices
January 17	12. Polynomials	Degree, Division Algorithm
January 19	13. Polynomial Functions	Synthetic Division and Interpolation
January 22	14. Various Functions	Exponential and Logarithmic Functions
January 24	15. Summary	Quiz 4: Polynomials and Functions
January 26	16. Limits and Continuity	Concept of Limits and Continuous Functions
January 29	17. Limits of Sequences and Functions	Applications of Factor Theorem
January 31	18. Summary	Quiz 5: Limits and Continuity of Functions
February 5	19. Differentiation	Derivatives, Slope of a Tangent Line
February 7	20. Differentiation of Functions	Products, Quotients and Composite Functions
February 9	21. Applications	Local Extrema, Mean Value Theorem
February 12	22. Summary	Quiz 6: Applications of Derivatives
February 14	23. Integration	Antiderivatives
February 16	24. Fundamental Theorem of Calculus	Definite and Indefinite Integrals
February 19	25. Integration of Various Functions	Integration Techniques
February 21	26. Summary	Quiz 7: Integration
February 23	27. Summary of the Course	Review
February 26	28. Review	Review for Final Examination

January 8: No Class, National Holiday. February 2: No Class, Preparation for General Admissions Test.

Learning Goals

To understand logic, basic theory of system of linear equations and matrices, and calculus. Students are ready to take foundation courses of mathematics and social science courses requiring basic mathematical skills and thinking. 論理、連立一次方程式の基礎理論と行列の活用、微分積分の基礎を理解しながら、数学的思考を経験し、基礎科目の数学および社会科学における数学の理解につなげる。

Grading Policy

1. Quiz: total of 84 pts. 7 quizzes（10 pts each) are scheduled. 2 extra pts will be given for each quiz attendance (maximum 14 in total). Submit or re-submit a quiz at the next quiz (or at the final for the last quiz) if you are absent or your score is less than 4 pts, and 40 percents of the score of it will be recorded for the quiz. You can find quizzes and their solutions in Moodle. Late submission will be accepted only if there is a special reason.

2. Short Paper: 16 pts. See below.

3. Final Examination: 100 pts.

4. Total: 200 pts. See https://icu-hsuzuki.github.io/science/class/ns1b/ns1b_grade-j.html

Language of Instruction

Lectures, quizzes and the final examination will be given in English. Paper should be written in English. For quizzes and the final examination, students are allowed to use Japanese but encouraged to use English. Comments and questions in comment sheets and quizzes can be in Japanese.

Paper

1. Topic: Applications of Mathematics including Statistical Analysis in daily life with a brief explanation of Mathematics used.

2. Language: English

3. Cover Page: ID Number and Name

4. Body: Two pages (A4 size paper) with Title. Please use one side only and a paper clip (no stapling).

5. Due: 4:00 p.m. February 7. Deposit in the report submission box at H113, CTL *Madoguchi*.

6. Papers, only the body, will be posted in Moodle after scanning them.

Important Information and Learning Support

The course is designed assuming that students spend about three hours per week (in avarage) for review and preparation for a quiz. Extra time for review is expected for the final examination.

1. Final will be given during the term exam week. Quizzes and Final Exam are in open book style.

2. Moodle: https://moodle.icu.ac.jp/27/course/view.php?id=1565 Key: mms2017

   Handouts, videos, responses to comment sheets, quizzes and much more.

3. Course Home Page (basic information): https://icu-hsuzuki.github.io/science/class/ns1b/

   Old quizzes, final examinations, grading policy and results and much more.

4. Math Helpdesk: Science Hall S302 (12:50 p.m. – 4:20 p.m., M. & W.)

5. Office Hour: 2/M, 2/W, 10:10 a.m. - 11:20 p.m. or with appointment by email. (Science Hall S309)

6. Email: hsuzuki@icu.ac.jp   Office Phone: 0422-33-3292

7. ICU Open Courseware: http://ocw.icu.ac.jp/ge/gen024_2014w/ (The language of Instruction of the course in 2014 was J/E.)

8. Kahn Academy: https://www.khanacademy.org/math (Related contents of each section of the course are listed in Moodle. For some videos, Japanese translation is available)

9. e-カレッジ（千歳科学技術大学）: http://himemasu.chitose.ac.jp/CIST-Shiva/ （中学以上の教科書の内容と、演習問題 (Adobe Flash) があります。コースの関連箇所は Moodle 内に示してあります）

Tea Time

Black and White Cats   There are three, i.e., Haruna, Kana and Rina. Two have white cats and two have black cats. All have either white cats or black cats or both. Whoever has black cats always tells a lie. (Otherwise they may tell a lie or a truth.)
Rina says Kana has white cats, and Kana says Haruna has white cats.
Who has which?

小野田博一著「史上最強の論理パズル」'*Shijo-Saikyo no Ronri Pazuru*', Hirokazu Onoda

Two Girls?   One of my friends has three children. I know that one of them is a girl. What is the probability that this friend has another girl? What is the probability if the girl I know is the youngest?

Express 10 with 3, 4, 7 and 8?   Is it possible to express 10 using 3, 4, 7 and 8 exactly once and $+, -, \times, /$ and parentheses? For example, $0 = (3 + 4 - 7) \times 8$, and $1 = (4 - 3)/(8 - 7)$.

   Please post your solution to Forum "Questions and Comments" in Moodle. Not just a solution, but a good and easy to understand explanation, and/or different solutions are welcome. You are also encouraged to post problems to the forum.
   Let's enjoy Mathematics and mathematical thinking together!!

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