

Math 1020Q – UCONN at Stamford – May 2025 Session Syllabus – Problem Solving, Mondays, Tuesdays, Wednesdays and Thursdays 6:00 pm – 9:20 pm WeBex room crh02006 (room unlocked, no password required)

Instructor: Cristiano Husu, cristianohusu@sbcglobal.net, 203-329-0489, cristiano.husu@uconn.edu, Office Number 334.

OFFICE HOURS at the end of each class at 9 pm or by phone 203 329 0489 or by email at cristianohusu@sbcglobal.net

Textbook: Detailed lecture notes written by the instructor will be available before each class on huskyct.uconn.edu. Classwork, homework and review files for the three examinations also written by the instructor will also be available.

Prerequisites: MATH 1010 or equivalent.

Classwork and Homework. Classwork problems will be assigned during every class. Samples of your work will be collected at the end of each class by pictures of PDF files to the email cristianohusu@sbcglobal.net. Homework on topics covered in previous lectures will also be assigned at the end of some of the classes.

Grading Procedure: The course grade will be the result of the sum of the following four numbers:

- 1) Classwork and homework altogether 20 points (and 20% of the course grade),
- 2) The first examination on May 15, another 20 points (and 20% of the course grade),
- 3) The second examination on May 22, another 20 points (and 20% of the course grade),
- 4) The comprehensive final examination, on May 28, 40 points (and 40% of the course grade).

The standard grading procedure will be applied as stated at the top of the following page, below.

A total of 90 points (or more) will correspond to the letter A grade for the course.

A total of 80 points (up to 89 points) will correspond to the letter B grade (or slightly higher, B+ or A-) for the course.

A total of 70 points (up to 79 points) will correspond to the letter C grade (or slightly higher, C+ or B-) for the course.

A daily description of the course follows in the rest of the syllabus.

The first week:

May 12, 2025: The first P of the P.S.S.S.P. procedure: Be Proactive. The principle of intimate engagement of the problems that we wish to solve.

Classwork to evaluate how proactive and visual we are.

May 13, 2025: The first S of P.S.S.S.P. See it. Externalize. **Do not display and manipulate information at the same time.**

Polya's ways to externalize: Drawing pictures and sketches. Making Tables and Charts. Trial and error. Guessing and checking. Thinking backward. Inductive reasoning. Looking for patterns. Looking for formulas and using them. Constructing basic equations and solving them. Etc.

May 14, 2025: Ten ways to externalize, with a logic puzzle, *the three grandfathers*, as an example of the overarching problem of comprehension. *Homework on beginners' visualizations: "Commuter", "Desert delivery"*. Commuter with variations on the time of arrival home (on that "special, sunny day").

Committing information to memory.

Review for the first examination.

May 15, 2025: The second S of the P.S.S.S.P. procedure: Simplify. Introduction to simplifying. *Visualizations and simplifications. The game of hex (percolation).*

First examination on Be Proactive and See It.

The second week:

May 19, 2025: Four ways to simplify – Four ways to find simpler (easier) problems related to a difficult problem that we cannot solve. *The “bouncing bishop” visualizations on any rectangular extension of the chessboard. (The “bouncing knight” problem, a variation of the variation of the bouncing bishop.)*

Classwork for an initial assessment of how we simplify problems we cannot solve. *Dinner Parties*. The relationship between *Dinner Parties* and *Seven Elevators*.

May 20, 2025: **The sequence effect.** Simplifying with integers.

May 21, 2025: *Polyominoes. Tiling with polyominoes. Additional tilings with polyominoes. (Polyhexes. Polyiamonds.)*

Review for the second examination.

May 22, 2025: Further simplifications. Going to the extremes. **The third S of the P.S.S.S.P. procedure: Stir It Up.** Homework on simplifying the “Forty thieves” problem. (The “Five pirates” variation.)

Second examination on See It and Simplify (including the sequence effect).

The third week:

May 27, 2025: **The third S of the P.S.S.S.P. procedure: Stir It Up.** Facilitate flexibility. *Avoid Group Thinking. (We do not wish to get stuck in our own ways.) Think laterally (E. De Bono, 1964). The Einstellung effect. (Avoid being functionally fixated.) Brainstorm. (Beware the way numbers put a “spell” on us).*

May 28, 2025: **The last P of the P.S.S.S.P. procedure: Pause and reflect.**

Review for the comprehensive final examination.

May 28, 2025: *The comprehensive final examination.*

Extra credit projects

Finding happiness.

Simplify Nine Men Morris (Mill's Game). The first three-steps (placements) of a strategy to win Nine Men Morris.

Simplify Percolation (*The Game of HEX*). The winning strategies for the Game of HEX on 3×3 , 4×4 and 5×5 hexagonal grids.

The one hundred fowl problem. Additional Diophantine equations.

Will the world end on a Sunday and at the beginning of a new century? The case for understanding our calendar