

Professor Sandra Clarkson

Room 931HE

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OFFICE HOURS

T.B.A. Room 931HE.

Required Text:

Problem Solving Strategies: Crossing the River with Dogs by Johnson and Herr; Key Curriculum Press. 2nd Ed, 2001.

Course Expectations

Students should attend all classes. More than one absence will affect the grade. Two late arrivals will be considered one absence.

Students must actively participate in all class sessions.

Students must complete all assignments for the course.

Competencies That Students Will Develop in the Course

Overarching Objectives:

At the conclusion of the course,

- 1) Students will know, understand and utilize problem solving strategies used in the school curriculum.
- 2) Students will be able to use physical models and logical discourse to explain solutions to mathematical problems.
- 3) Students will be able to explain solutions to mathematics problems from algebraic, geometric and numerical perspectives.
- 4) Students will examine, understand and be prepared to teach problem solving heuristics to elementary, middle or high school students, depending on the focus of their own studies.

Content-specific objectives:

At the conclusion of the course, the students will be able to:

- 1) Use appropriate problem solving heuristics to solve mathematics problems.
- 2) Present and defend solutions to non-routine mathematics problems.
- 3) Be familiar with problem solving research.
- 4) Know strategies for helping others learn to solve problems.
- 5) Understand the difference between an exercise and a problem.
- 6) Generate and utilize data to solve problems.
- 7) Know when they have a solution and be able to justify their results.
- 8) Be able to identify appropriate problems and problem solving activities for their classrooms.

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|-----------------|--|--|
| CLASS 1 | Intro to the Course | Come prepared to work: |
| CLASS 2 | 1 Draw a Diagram | 1A: 1, 3, 5-9 |
| CLASS 3 | 2 Systematic Lists /3 Eliminate Possibilities | 2A: 6, 9,10 3A: 1, 3, 4, 7, 8, 10 B: 1, 4 |
| CLASS 4 | 4 Matrix Logic | 4A: 1, 3, 5, 7 B: 1,5 |
| CLASS 5 | 5 Look for A Pattern | 5A: 2, 6, 11, 12 B: 1 |
| CLASS 6 | 6 Guess and Check 11 Work Backwards | 6A: 7, 8, 12, 13, 17, B: 4 11A: 2, 9, 12 |
| CLASS 7 | 8 Unit Analysis | 8A: 1, 2, 10, 12, 13, 14 B: 1 |
| CLASS 8 | 10 Physical Representations | 10A1: 2, 4 10A2: 7, 10, 11, 12, 14, 15 |
| CLASS 9 | 12 Venn Diagrams | 12A: 4, 5, 7, 8 B: 2, 4 |
| CLASS 10 | 13 Algebra 14 Finite differences | 13A: 4, 6, 8, 9, 10 B: 1, 2 14A: 1 B: 1, 2, 5 |
| CLASS 11 | 15 Other Ways to Organize Information | 15A: 1, 5, 6 B: 1, 3 |
| CLASS 12 | 16 Change Focus | 16A: 1, 2, 4, 7, 19 B: 1, 2 |
| CLASS 13 | Research Presentations | |
| CLASS 14 | Research Presentations | |

BLACKBOARD

You are expected to use Blackboard during the semester to access class notes and receive relevant course emails and materials. It is your responsibility to have a working Hunter email. I will send you an email from Blackboard prior to your first class. If you do not receive that email, you must contact the Student Help Desk for help. We may be using the Wiki feature on Blackboard. If you have trouble using it, contact the Student Help Desk.

CLASS PARTICIPATION

Class periods will be mostly for presenting and critiquing solutions. Come prepared. Even if you have not been able to solve a problem, you should be able to start the solution and your classmates will help you. This is a working class. The additional hour should be spent working problems.

HOMEWORK

Students will keep a loose-leaf version of a Problem Book to be turned in at the end of the semester. For this book, students will work assigned problems to be completed prior to each class period. For each problem, the participant should:

- Present a completed, detailed, solution using the heuristic presented in that chapter.
- Write out any questions (s)he may still have about the problem.
- Be prepared to present a solution to a problem at any point to classmates. If a student has not yet been able to complete a solution, (s)he should be prepared to discuss what approaches to the problem have been used and at what point in the solution (s)he realized that each approach would not work.

JOURNAL

You will also keep a journal. This can be loose-leaf also. This journal will contain responses to prompts about teaching, problem solving, readings, etc. Additionally, for each Heuristic we study (14 of them), you should write your own problem that can be solved using that heuristic. Each of these ORIGINAL problems should be typed and be accompanied by its solution (typed except for explanatory notes, markings, diagrams, etc.). This should be in a form that can be easily reproduced. At the end of the semester, I will scan all of these problems (put your name on each of these problems so you claim authorship). I will email the scanned problems to all at the end of the course.

REAL LIFE PROBLEM

Students, in small groups, will work on an (assigned) real life problem throughout part of the semester. The problem solution is expected to be developmental in that, as a solution is developed, the students begin refining it and/or extending it to show (s)he has a grasp of how to approach a real life problem with no well-defined solution path. This write-up will be done in a WIKI. Students will develop the rubrics used to assess the final product and will participate in the assessment of each other's work. We will develop the rubrics in class.

STAR PROBLEMS

STAR problems will be assigned. You will complete 15 of them, selected from a larger group. For each problem, you should:

Think of a solution write-up for each of the *STAR* problems like a take-home test. You will have access to resources, including classmates and class notes, but the write up should be entirely yours. The final product should be excellent.

RESEARCH PRESENTATION

At the end of the semester, you will be asked to make a research report to the class. We will work out the details during the first class period where you and a small group will determine the format, requirements and means of assessment and we will vote on the various options. The research report will be a 10 minute presentation to the class based on your reading and interpreting two research based articles on problem solving in the secondary classroom.

EXAMS

There will be no exams.

GRADING

| Activity | Due Date | Maximum Possible Points |
|-----------------------------------|------------------|-------------------------|
| Class Participation/Preparation | every class | 15 % |
| Homework Book | Dec 18 | 15 % |
| Journal | Dec 18 | 10 % |
| Real Life Problem solving writeup | Dec 18 | 15 % |
| *STAR* Problem solutions | Dec 18 | 30 % |
| Research Presentation | Dec 4, 11 and 18 | <u>15 %</u> |
| Total | | 100 % |

I will not give a CR/NC grade in this class.

Plagiarism Statement

WARNING: If you cheat in my class, I will bring formal charges against you. Be smart; study and do your own work.

Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The college is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures.

FINAL PRESENTATIONS: Dec 4, 11 and 18, 5:30 – 7:30, in the classroom.

IF YOU HAVE A DISABILITY THAT YOU BELIEVE REQUIRES SPECIAL ACCOMODATIONS: In compliance with the American Disability Act of 1990 (ADA) and with Section 504 of the Rehabilitation Act of 1973, Hunter College is committed to ensuring educational parity and accommodations for all students with documented disabilities and/or medical conditions. It is recommended that all students with documented disabilities (Emotional, Medical, Physical and/or Learning) consult the Office of AccessABILITY located in Room E1109 to secure necessary academic accommodations. For further information and assistance please call (212- 772- 4857)/VRS 646.755.3129.