GE184X
Problem Solving
[Onsite]

Course Description:

This course introduces students to problem solving techniques and helps them apply the tools of critical reading, analytical thinking and mathematics to help solve problems in practical applications.

Prerequisite(s) and/or Corequisite(s):

None.

Credit hours: 4

Contact hours: 40 (40 Theory Hours)

Syllabus: Problem Solving

Instructor:	_____
Office hours:	_____
Class hours:	_____

Major Instructional Areas

1. Problem-solving strategies
2. Critical reading
3. Analytical thinking
4. Numeric, symbolic, and graphic reasoning
5. Applications problems
6. Selected mathematical concepts and research skills

Course Objectives

1. Apply critical reading to enhance clarity and comprehension of content.
2. Apply analytical thinking to determine relations between facts in selecting the best approach to solving a problem.
3. Organize, interpret, and express ideas graphically, numerically, symbolically, and in writing.
4. Select from available methods the most efficient and effective way to solve a variety of problems.
5. Manipulate units of measurement and dimensions in calculations.
6. Execute the mathematical operations required to solve a variety of problems.
7. Interpret answers obtained and determine which, if any, is correct.

8. After determining the solution(s) to a problem, evaluate the methodology followed with regard to effectiveness and efficiency.
9. Demonstrate the appropriate use of technology to solve problems and judge the reasonableness of the results.

SCANS Objectives

SCANS is an acronym for Secretary's Commission on Achieving Necessary Skills. The committee, created by the National Secretary of Labor in the early 1990s, created a list of skills and competencies that the committee feels are necessary for employees to function in a high-tech job market.

1. Locate, understand, and interpret written information in documents such as manuals, graphs, and schedules.
2. Organize ideas and communicate the ideas in writing.
3. Explain concepts.
4. Interpret and summarize information.
5. Use problem-solving method to solve problems.
6. Interpret and apply new knowledge and experience.
7. Assess self accurately, set personal goals, and monitor progress.
8. Use computers to process information.
9. Process information and present it graphically using a computer.
10. Interpret information present in various forms such as graphs, charts, and matrices.

Course Outline

Unit	Activities
1– It's Not Easy, but It's Fun!	• Content Covered: *Strategies for Creative Problem Solving:* ○ Chapter 1, pp. 1-11

Unit	Activities
	Mathematics in Action: ○ Chapter 1, pp. 1-71 • Writing Assignment: 1.1 • Exercises: 1.1, 1.2
2– Getting Started: Secrets of Effective Problem Solving	• Read from *Strategies for Creative Problem Solving:* ○ Chapter 2, pp. 13-32, omit pp. 16-17 *Mathematics in Action:* ○ Chapter 2, pp. 79-193 • Writing Assignment: 2.1 • Exercises: 2.1, 2.2
3– Getting in the Game: Collecting Information	• Read from *Strategies for Creative Problem Solving:* ○ Chapter 3, pp. 37-45 *Mathematics in Action:* ○ Chapter 3, pp. 203-282 • Writing Assignment: 3.1, 3.2 • Exercises: 3.1, 3.2
4– A Guide on the Side: A Handle on the Problem	• Read from *Strategies for Creative Problem Solving:* ○ Chapter 4, pp. 47-72 *Mathematics in Action:* ○ Chapter 4, pp. 289-324 • Writing Assignment: 4.1 • Exercises: 4.1 • Unit Exam: 1
5– An Idea Can	• Read from *Strategies for Creative Problem Solving:*

Unit	Activities
Change Your Life	○ Chapter 5, pp. 89-106 *Mathematics in Action:* ○ Chapter 5, pp. 327-388 • Writing Assignment: 5.1 • Exercises: 5.1, 5.2
6– Looking for Solutions	• Read from *Strategies for Creative Problem Solving:* ○ Chapter 6, pp. 111-126 and p. 134 *Mathematics in Action:* ○ Chapter 6, pp. 393-426, pp. 543-544 • Writing Assignment: 6.1 • Exercises: 6.1, 6.2
7– Making the Right Choice	• Read from *Strategies for Creative Problem Solving:* ○ Chapter 7, pp. 139-163 *Mathematics in Action:* ○ Chapter 6, pp. 427-472, pp. 545-546 • Writing Assignment: 7.1 • Exercises: 7.1, 7.2 • Unit Exam: 2
8– Fasten Your Seat Belts: Ready to Carry the Plan Through	• Read from *Strategies for Creative Problem Solving:* ○ Chapter 8, pp. 173-181 and pp. 186-188 *Mathematics in Action:* ○ Chapter 6, pp. 473-542, pp. 546-548 • Writing Assignment: 8.1 • Exercises: 8.1, 8.2

Unit	Activities
9– One for the Road	• Read from *Strategies for Creative Problem Solving:* o Chapter 9, pp. 193-204 o Chapter 10, pp. 213-229 *Mathematics in Action:* o Chapter 7, pp. 559-655 • Writing Assignment: 9.1 • Exercises: 9.1, 9.2 • Course Project: Start
10– To Cut a Long Story Short	• Read from *Strategies for Creative Problem Solving:* o Chapter 11, p. 235, p. 260 • Read from *Mathematics in Action:* o Chapter 8, pp. 659-718 • Unit Exam: 3 • Exercise: 10.1
11– Course Review, and Course Project	• Course Review • Course Project: Submit

Instructional Methods

You are called upon to solve problems every day, from mundane problems such as what to wear or where to go for lunch to more important problems such as those related to school work or your job. The more complex a problem, the larger the number of alternative solutions. The goal is to choose the best solution. This course will sharpen your problem-solving skills and help you master mathematical concepts and problem-solving techniques required to tackle all kinds of complex problems.

The course will examine specific cases and examples of real-life situations that demonstrate how problem-solving techniques apply to specific scenarios.

The assigned reading of the math problem-solving section will include scenario-based activities and summaries of key concepts and basic rules. You are encouraged to walk through the step-by-step activities, if required.

You will be assessed on the basis of your assignments, including writing assignments, math exercises, and unit exams.

The course will conclude with a course project, which is due at the end of the course. This project will require you to apply the techniques discussed in the course to define and solve a real-world problem.

Instructional Materials and References

Student Textbook Package

- Fogler, Scott H. and Steven E. LeBlanc. *Strategies for Creative Problem Solving.* Indianapolis: Pearson Custom Publishing, 2008.

- The Consortium for Foundation Mathematics. *Mathematics In Action. Indianapolis: Pearson* Custom Publishing, 2008.

- *Concept Videos to Accompany Mathematics in Action for ITT Technical Problem Solving.* Indianapolis: Pearson Custom Publishing, 2008.

- *MathXL Exercises to Accompany Strategies for Creative Problem Solving. Indianapolis:* Pearson Custom Publishing, 2008.

References

ITT Tech Virtual Library

Log on to the ITT Tech Virtual Library at http://www.library.itt-tech.edu/ to access online books, journals, and other reference resources selected to support ITT Tech curricula.

Books

You may click “Books” or use the “Search” function on the home page to find the following books.

ITT Tech Virtual Library> Main Menu> Books>

- Shea, Virginia. *Netiquette. Online ed. 1.1. San Francisco: Albion Books,* 1997.

ITT Tech Virtual Library> Main Menu> Books> Ebrary>

- Bluman, Allan G. *Math Word Problems Demystified. Blacklick, OH: McGraw-*Hill Professional Publishing, 2004.

- Brookhart, Clint. *Go Figure!: Using Math to Answer Everyday Imponderables.* Blacklick, OH: McGraw-Hill Professional Publishing, 1999.

- Gibilisco, Stan. *Everyday Math Demystified. Blacklick, OH: McGraw-Hill* Professional Publishing, 2004.

- Johnson, *Mildred. How to Solve Word Problems in Algebra. Blacklick, OH:* McGraw-Hill Professional Book Group, 1999.

- Rowland, Robin. *Creative Guide to Research: How to Find What You Need... Online or Offline. Franklin Lakes, NJ: Career Press, Inc., 2000.*

- Sanders, Ralph. *Executive Decision Making Process: Identifying Problems & Assessing Outcomes. Westport, CT: Greenwood Publishing Group, Inc., 1999.*

Program Links

You may click “Program Links” or use the “Search” function on the home page to find the following program links.

- General Education / Technical Basics> Recommended Links> Mathematics

Other References

The following resources may be found **outside** of the ITT Tech Virtual Library, whether online or in hard copy.

Books

- Treffinger, Donald J., Scott G. Isaksen, and K. Brian Stead-dorval. *Creative Problem Solving: An Introduction. 4th ed. Waco, TX: Prufrock Press Inc., 2006.*

Web sites

- http://www.sosmath.com/algebra/algebra.html (accessed August 2, 2007)

S.O.S. mathematics is a free resource for algebra review. It is a great study site for high school and college students and adult learners.

- http://www.math.com/students/practice.html (accessed November 6, 2007)

Math Practice provides a good practice sequence for you to receive immediate feedback on whether or not you tackled a problem correctly.

- http://mathforum.org/library/topics/basic_algebra/ (accessed August 2, 2007)

Math Forum Internet Mathematics Library contains a comprehensive list of resources on various algebra topics.

- http://www.purplemath.com/ (accessed August 2, 2007)

PurpleMath contains online algebra tutorials. The site also offers numerous links and homework guidelines.

- http://www.mathleague.com/help/help.htm (accessed August 2, 2007)

Math League is dedicated to presenting challenging mathematical problems and concepts to students. Math League Help contains articles on various topics related to elementary and intermediate mathematics.

- http://www.aaaknow.com (accessed August 2, 2007)

AAA Math features a comprehensive set of interactive lessons. Unlimited practice is available to enable you to master the concepts. The topics are sorted by subjects as well as by levels of difficulty.

All links to Web references outside of the ITT Tech Virtual Library are always subject to change without prior notice.

Course Evaluation and Grading

Evaluation Criteria Table

The final grades will be based on the following categories:

CATEGORY	WEIGHT
Unit Exams	15%
Exercises	35%
Writing Assignments	25%
Course Project	25%
Total	**100%**

Grade Conversion Table

The final grades will be calculated from the percentages earned in the course, as follows:

A	90-100%	4.0

B+	85-89%	3.5
B	80-84%	3.0
C+	75-79%	2.5
C	70-74%	2.0
D+	65-69%	1.5
D	60-64%	1.0
F	<60%	0.0

