

Marshall University

College of Science

Mathematics Department

## **MTH 121: Concepts and Applications (CT)**

## **MTH 121B: Concepts and Applications – Extended Version (CT)**

### **Course catalog description**

Critical thinking course for non-science majors that develops quantitative reasoning skills. Topics include logical thinking, problem-solving, linear modeling, beginning statistics and probability, exponential and logarithmic models, formula use, and financial concepts.

### **Credit hours**

MTH 121: 3 hours

MTH 121B: 4 hours

### **Prerequisites**

MTH 121: ACT Math 19, or C or better in MTH 099 or MTH 100

MTH 121B: ACT Math 18 or below

### **Critical thinking (CT) designator**

This course carries a CT designator, and students who complete MTH 121 receive 3 hours of CT credit towards their general education requirements (4 hours for MTH 121B).

### **Learner outcomes**

(1) Students will analyze real-world problems quantitatively, formulate plausible estimates, assess the validity of visual representations of quantitative information, and differentiate valid from questionable

- statistical conclusions. Students will apply the **quantitative thinking** skills that they learn to analyze problems dealing with finance and exponential growth and decay, and logarithmic models.
- (2) Using **metacognitive thinking**, students will evaluate the effectiveness of their project plan or strategy to determine the degree of their improvement in knowledge and skills.
  - (3) When students apply **integrative thinking**, they will make connections and transfer skills and learning among varied disciplines, domains of thinking, experiences, and situations.
  - (4) Students will formulate focused questions and hypotheses, evaluate existing knowledge, collect and analyze data, and draw justifiable conclusions as they apply **inquiry-based thinking**.
  - (5) Students will demonstrate their **communication fluency** skills to present their research to specific audiences. Each student will work on five short projects on a variety of topics to be determined by the instructor.

### Course topics

- (1) **Understand how to argue more effectively and understand arguments in every day conversations and news reports or other media.** Evaluate media information.

This topic addresses course learning outcomes 3 and 5. It also addresses the university learning outcome Information Literacy, though this is not a specific course outcome.

From Chapter 1, this topic corresponds to sections 1A, 1B, 1C, and 1D; also 1E (selected examples, if desired). Truth tables should be deemphasized, possibly not covered at all.

- (2) **Understand meanings of numbers in everyday use,** including units, percentages, estimations, comparisons, errors, and data presented in graphs.

This topic addresses course learning outcomes 1, 3, and 5. It also addresses the university learning outcome Information Literacy, though this is not a specific course outcome.

From Chapter 2, this topic corresponds to sections 2A, 2B; also 2C (selected examples, if desired). Students can be given unit equivalencies. From Chapter 3, sections 3A, 3B, 3C; also 3D and 3E (selected examples, if desired). From Chapter 5, section 5D.

- (3) **Understand financial mathematics**, including savings accounts, loans, credit card interest, and personal budgeting.

This topic addresses course learning outcomes 1 and 5.

From Chapter 4, this topic corresponds to sections 4A, 4B, 4C, 4D; also 4E and 4F (selected examples, if desired). In section 4C Types of Investments can be covered, if desired. Section 8A can be used to visually support simple vs compound interest and the graphing skills of section 5C, if desired. Use of on-line calculators is recommended for all financial formulas.

- (4) **Understand basic probability and statistics**, including how statistical studies are conducted, evaluating statistical claims, interpreting statistical graphs and tables, descriptive statistics, measures of variation, the normal distribution, computing basic probabilities, and adding and multiplying probabilities.

This topic addresses course learning outcomes 1, 3, 4, and 5. It also addresses the university learning outcome Information Literacy, though this is not a specific course outcome.

From Chapter 5, this topic corresponds to sections 5A, 5B, 5C; also 5E (selected examples, if desired). In section 5C, histograms should be covered; other graphs can be covered, if desired. From Chapter 6 sections 6A, 6B, 6C; also 6D (selected topics, if desired). From Chapter 7 sections 7A, 7B; also 7C, 7D, and 7E (selected topics, if desired).

Course learning outcome 2 on metacognitive thinking is not specifically addressed by any course topic. Instructors must incorporate in or out of class activities to

address metacognitive thinking. To get you started thinking about incorporating metacognitive thinking, two possible activities are as follows.

- (1) Use the Prologue to discuss why students are in the class and what they can get out of the course. Use the Prologue to discuss how students can improve study skills and develop a growth mindset.
- (2) Incorporate metacognitive activities into one of the course projects. Use questions at the end of a project and project report that ask students to reflect on their work process and understanding of the process.

## **Projects**

Projects can be assigned from any topics in the course. Instructors should assign at least one project and can assign any number of projects. Projects should explicitly address course learning outcomes 2 and 5. Particular projects should address other course learning outcome, as appropriate.

## **Technology**

Students must have a calculator that can perform exponentiation (e.g.  $x^y$ ).

## **Suggested textbooks**

- Bennett and Briggs, *Using and Understanding Mathematics*

## **Last updated**

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