

The Well-Trained Mind Academy
Astronomy

Course Blackboard site: <http://wtma.blackboard.com>

Required Texts:

- *The Kingfisher Science Encyclopedia*, 3rd ed. New York: Kingfisher, 2012 (ISBN 978-0753458860)
- *Astronomy for the Logic Stage Student Guide*, Well-Trained Mind Academy Ed. Niceville, FL: Elemental Science, 2016.

Recommended

- Lippincott, Kristin. *Astronomy DK Eyewitness Book*. New York: DK Children, 2008. (ISBN 978-0756637675)
- Dickinson, Terence. *Exploring the Night Sky*. Buffalo, NY: Firefly Books, 1987 or 1998. (ISBN 978-0920656662)

Course Description:

This class studies astronomy at a logic-stage level by making use of *Astronomy for the Logic Stage Student Guide* (Well-Trained Mind Press edition), and *The Kingfisher Science Encyclopedia* (KSE), as well as numerous instructor-assigned supplemental materials. Students will use various internet-based sources, time lines, summaries, and outlines to learn about astronomy, from the earliest stargazing to the newest scientific discoveries.

Written Assignments:

- *Outlines (two per semester), 10%*: 1-page two or three-level outlines of assigned reading. Instructor will assist with outline structure and will allow chances for revision (see *Policies* section of syllabus). Outlines must be typed and submitted as Word documents in Blackboard.
- *Written summaries (three per semester), 12.5%*: 1-2 page (300-500 word) summary of assigned *Kingfisher Science Encyclopedia* reading. Summaries must be typed and submitted as Word documents in Blackboard.
- *Primary source checklist (two per semester), 12.5%*: Completed evaluation of an internet source assigned in class. Internet sources are tentatively scheduled as being selections from:
 - Nicolas Copernicus: From *The Revolutions of the Heavenly Bodies*, 1543
<http://sourcebooks.fordham.edu/mod/1543copernicus2.asp>
 - On Nuclear Reactions Occurring in Very Hot Stars
http://articles.adsabs.harvard.edu/cgi-bin/nph-iarticle_query?bibcode=1954ApJS...1..121H&db_key=AST&page_ind=0&plate_select=NO&data_type=GIF&type=SCREEN_GIF&classic=YES

Students will be asked to answer the following questions in 2-4 sentences each, in a Blackboard test:

- What does this source say? (content)
- Who is the author?
- What is the writer's purpose?

- What events led to this piece of writing?
- What happened as a result of this writing?
- *Science fair project, 20%*: The student will complete a research project on a topic in Astronomy; the topic will be chosen by the student but must be approved by the instructor before research begins. The results will include a 2-4 page summary (500-1000 word), using at least *two sources* from outside class materials. Students are required to use illustrations, student-created hands-on projects, or other non-written materials to support the project. All material must be electronically recorded (photographed, videoed, etc) and the recording uploaded into Blackboard.

Assessments and Discussion Questions:

- *Weekly Discussion Questions (DQs)*: Discussion questions will be drawn from lectures, supporting materials, the *Astronomy for the Logic Stage*, and the *Kingfisher Science Encyclopedia*. Each student must write a meaningful reply to the question by midnight, EST, Monday, and meaningfully respond to two other students' responses by midnight, EST, on Wednesday. See the Assignment policies for more information about meaningful participation. 5% of final grade, total.
- *Weekly comprehension quizzes*: Quizzes will consist of image identification and item significance identification. Student's resources may be used. 5% of final grade, total. Online through Blackboard.
- *Unit Exams, 15%*: Blackboard-based examination on material covered since the beginning of the course. Identifications, short answers, and brief essay questions.
- *Final Exam, 10%*: Blackboard-based examination on material covered since the midterm exam. Identifications, short answers, and brief essay questions.
- *Time Line, 10%*: The student will mark given important dates, weekly, on the sheets provided in the student guide. It must be scanned or photographed, and then uploaded into Blackboard two weeks before the final exam.

Course Work	Percentage
Weekly Quizzes	5%
Discussion Questions	5%
Primary Source Checklists	12.5%
Written Summaries	12.5%
Outlines	10%
Unit Exams	15%
Final Exam	10%
Timeline	10%
<hr/>	
Total	100%

Policies and Procedures:

Assignments:

- *Assignment Submission and Late Work Policy*: Assignments are due by 12 am Eastern Standard Time (-5:00 UTC) on the date listed in the syllabus. Late work will receive a letter grade reduction for every day that it is late, up to five days. After five days, late work will not

be accepted. Essay assignments are to be submitted via BlackBoard in either .pdf, .doc, .docx, or .rtf format.

- *Formatting and Style*: Formatting is to be 12-point Times New Roman, double-spaced, with 1” margins. Use a single space between sentences, always use the Oxford comma, avoid the use of passive voice, and do not use the first person or address the audience directly. Students are to refer to the APA Style Manual. If students wish to purchase a hard copy, use ISBN-13: 978-1433805615 or ISBN-10: 1433805618.
- *Assignment Prior Review*: Students may submit an outline for feedback one week in advance of the deadline. Papers will be returned with written feedback at least 24 hours prior to the submission deadline. This option is not available for the final exam.
- *Assignment Revision*: Within one week after receiving graded papers, students may revise papers for an improved grade, not to exceed one letter grade above the original grade. This option is not available for the final exam.
- *Meaningful Participation*: A good rule of thumb is if you don't spend at least several minutes thinking about or developing your position and explaining it in a concise and clear manner, then it probably will not be meaningful. Criticizing without offering support is not considered worthwhile participation, and you will not receive credit. Examples of meaningful participation include:
 - Sharing a related experience
 - Commenting on others' experiences
 - Asking others questions about their ideas and/or experiences
 - Offering a different perspective about an idea that is being discussed
 - Describing an interesting idea from the week's reading and explaining what you learned
 - Asking the group a question about something in the course
 - Disagreeing (respectfully)
 - Describing a problem and asking for help
 - Describing how you've used something you've learned in the course
 - Sharing a relevant resource
 - Describing relevant research and sharing information on how to find it
 - Noting, briefly, the content and/or purpose of a useful website and providing a link (it is a violation of copyright law to copy the actual page)

Example Schedule:

Note: This schedule corresponds to the weekly chapter schedule in *Astronomy for the Logic Stage (ALS)*. The schedule is subject to updates. Please see Blackboard announcements for changes.

- *Monday*—Discussion Question Response
- *Wednesday*—Response to two other students due
- *Friday*—Weekly Quiz due; any Written Assignments (Unit Exams, Final Exam, Science Fair Project, etc.) due

Example Astronomy Schedule

Week	KSE	ALS Chapter	Assignment	Topic
0	--	--	Introduction	Orientation
1	386-387	1	Quiz, DQ	Universe
2	390-391	2	Quiz, DQ	Galaxies
3	392-393	3	Written Summary, DQ	Stars
4	--	4	Quiz, DQ	Constellations
5	--	5	Unit Exam, DQ	Constellations
6	394-395	6	Primary source, DQ	Sun
7	403-405	7	Outline, DQ	Inner Planets
8	400-402	8	Midterm Exam, DQ	Earth/Moon
			Spring Break	
9	406-407	9	Written Summary, DQ	Outer Planets
10	408-411	10	Primary source, DQ	Dwarf Planets
11	412-413	11	Unit Exam, DQ	Comets, Meteorites
12	414-415	12	Quiz, DQ	Astronomers
13	416-417	13	Written Summary, DQ	Looking Into Space
14	420-421	14	Outline, DQ, Timeline	Exploring Space
15	424-425	15	Unit Exam, DQ	Satellites
			Final Exam Research Project	No lecture

The Well-Trained Mind Academy
Biology for the Logic Stage

Course Blackboard site: wtma.blackboard.com

Required Texts

- [*Holt Science & Technology: Life Science Student Edition. ISBN 978-0030462245*](#)

Course Description

Biology for the Logic Stage is a course in the study of life and living things. This course will help us all to better appreciate the creatures around us, understand the marvels of the human body and the magnificent processes of life. Throughout the year, we will investigate why living things look and behave like they do. We will uncover the concepts of cells, DNA, classification and cycles in the biosphere, plants, invertebrates, vertebrates, migration and defenses in animals and the human body.

Many of the concepts we explore build on each other, making it essential for students to continually reflect on their understanding of the content. Students will be expected to demonstrate connections through narrative summaries and experimental design; to complete several independent and group projects; to develop and refine their observation and critical thinking skills and to practice working independently as well as in groups as they design experiments, conduct scientific investigations, develop skills in collecting and interpreting data, and write up reports.

In order to be successful, you must complete all assignments, be reflective of your understanding, collaborate and participate in class, and most importantly, ask for help if needed.

Assignments

Students will complete both individual lab reports and group lab reports, where two, three or four students will collaborate on a specific topic. Students will also complete narrative summaries associated with a specific topic. In addition, there will be two research-based projects to be carried out individually. Lab reports (individual and group) as well as narrative summaries are worth 40% of the final grade.

This is the breakdown for Assignments:

- 5 Independent Labs are each worth 4% for a total of 20%.
- 4 Group Labs are each worth 2.5% for a total of 10%.
- 5 Narrative Summaries are each worth 2% for a total of 10%.

Tests

There will be two tests assigned: one in the middle of the fall semester and one in the middle of the spring semester. The fall semester test will be a Blackboard based multiple choice test on material covered since the beginning of the course and the spring semester test will be a Blackboard based multiple choice test on material covered from the beginning of the spring semester. Each test is worth 10% of the final grade.

Mid-Year & Final Evaluations

The Mid-Year Evaluation will be a Blackboard based multiple choice examination on material covered from the beginning of the course through the end of the fall semester. The Final Evaluation will be a Blackboard based multiple choice examination on material covered from the beginning of the second semester through the end of the course. More detail will be provided on these assessments during the fall and spring semesters. Each evaluation is worth 10% of the final grade.

Famous Biologist Report

During the fall semester, students will be assigned a biologist and will conduct preliminary research, create an outline, write a rough draft, and then turn in a final report, with feedback from the instructor along the way. The report should be at least 200 words. This project is worth 10% of the overall grade.

Science Fair Project

During the spring semester, students will be given a choice of five topics and develop a science fair project that will require them to work through the scientific method from start to finish. This project is worth 10% of the overall grade.

Grading breakdown

- Assignments (individual/group lab reports and narrative summaries): 40%
- Test 1: 10%
- Test 2: 10%
- Mid-Year Evaluation: 10%
- Final Evaluation: 10%
- Famous Biologist Report: 10%
- Science Fair Project: 10%

Example schedule:

FALL SEMESTER	SPRING SEMESTER
<p>TOPIC 1: Weeks 1 - 3 Living Creatures Classification Scientific Names & Common Names The Scientific Method Group Lab: What kind of tree is it? Narrative Summary: DKES pg. 310 - 311</p>	<p>TOPIC 6: Weeks 18 - 20 Vertebrates Mammals Birds Reptiles Amphibians Fish Group Lab: Which type of fur keeps mammals warmer? Narrative Summary: DKES pg. 326 - 335</p>

<p>TOPIC 2: Weeks 4 - 6 Cells Prokaryotic Cells Plant Cells Animal Cells DNA Genetics Individual Lab: DNA Extraction</p>	<p>TOPIC 7: Weeks 21 - 23 Migration Animal Defenses Feeding and Nutrition Life Cycles Individual Lab: Design an animal that uses camouflage for defense.</p>
<p>FALL INDIVIDUAL PROJECT: Famous Biologist Biography</p>	<p>SPRING INDIVIDUAL PROJECT: Science Fair</p>
<p>TEST 1</p>	<p>TEST 2</p>
<p>TOPIC 3: Weeks 7 - 9 Cycles in the Biosphere Nitrogen Cycle Oxygen Cycle Phosphorus Cycle Carbon Cycle Water Cycle Individual Project: Diorama Narrative Summary: DKES pg. 372</p>	<p>TOPIC 8: Weeks 24 - 27 Human Body I Integumentary System Skeletal System Muscular System Nervous System Endocrine System Group Lab: Does adrenalin affect my breathing and heart rate?</p>
<p>TOPIC 4: Weeks 10 - 12 Life of Plants Parts of a Plant Fungi Angiosperms Gymnosperms Photosynthesis Individual Lab: Can I grow mold?</p>	<p>TOPIC 9: Weeks 28 - 31 Human Body II Circulatory System Respiratory System Digestive System Urinary System Immune System Individual Lab: Do kidneys filter out liquids or solids? Narrative Summary: DKES pg. 345</p>
<p>TOPIC 5: Weeks 13 - 16 Invertebrates Annelids, Platyhelminthes & Nematodes Cnidarians and Echinoderms Mollusks Crustaceans Insects Group Lab: Do insects play a part in decomposition? Narrative Summary: DKES pg. 320 - 323</p>	<p>Weeks 32 - 33 Science Fair Presentation Review for Final Evaluation</p>
<p>MID YEAR EVALUATION: Week 17</p>	<p>FINAL EVALUATION: Week 34</p>

The Well-Trained Mind Academy
Chemistry for the Logic Stage

Course Blackboard site: www.wtma.blackboard.com

Materials

There is no required text for this class. We will be using readings and labs from the [American Chemical Society](#) and other sources. We will be using mostly HTML-based simulations. Occasionally Java simulations may be used. If you are unable to run Java, I will provide a work around.

Course Description

This course is designed to provide inquiry-based instruction tailored to logic-stage (middle school) students of chemistry. Specific topics of exploration include the periodic table of elements, properties of matter and solutions, chemical reactions, acid-base chemistry, biochemistry, and the chemistry of industry. Throughout each unit of study, we will implement and discuss key components of the scientific method.

Many of the concepts we explore build on each other, making it essential for students to continually reflect on their understanding of the content. Students will be expected to demonstrate connections through narrative summaries, complete independent and group assignments, collect and analyze data, and compose written scientific reports.

Grading:

Labs and Assignments	45%	Attendance and Participation	5%
Chemist Biography	10%	Midterm and Final	10%
Science Fair Project	10%	Quizzes and Exams	20%

Assignments

Assignments will vary throughout the year. Each week different assignments will be given for you to complete. We will be doing labs, activity worksheets, solving problems and writing narrative summaries. All weekly assignments will be due on Sunday at midnight EST. Some assignments that are bigger (labs, projects) may take more time to grade. However, I will try to have all assignments returned within one week of the due date.

Famous Chemist Biography

During the fall semester, students will choose a chemist and will conduct preliminary research, create an outline, write a rough draft, and then turn in a final report, with feedback from the instructor along the way. Due dates will be specified when the assignment is given and place on the class calendar

Science Fair Project

During the spring semester, students will be given a choice of topics and develop a science fair project that will require them to work through the scientific method from start to finish. Students will present projects to their classmates.

Quizzes and Exams

Students will be assessed periodically on their comprehension of course material through quizzes and tests. These will always be announced at least one class period prior to the exam. Generally

speaking quizzes may be given more often than exams with 4-6 quizzes given per quarter and 2-3 exams.

Midterm & Final Exams

The Midterm Exam will be a Blackboard based test on material covered from the beginning of the course through the end of the fall semester. The Final Exam will be a Blackboard based test on material covered during the entire year. More detail will be provided on these assessments during the fall and spring semesters.

Google Docs and Group Work

Science is a collaborative process. As such, we will be utilizing Google Docs both inside and outside of class. Here your students can collaborate and work together in real time to create lab experiments, charts, tables, procedures, etc.

Example schedule:

Week	Lecture 1	Lecture 2
Week 1	Scientific Method	Measurement
Week 2	Metric System and Conversions	Metric System and Conversions
Week 3	Matter	Matter and Energy
Week 4	Temperature vs. Heat	Phase Change: Evaporation
Week 5	Phase Change: Condensation	Phase Change: Condensation
Week 6	Phase Changes: Freezing and Melting	Phase Changes: Freezing and Melting
Week 7	Melting Phase Change	Heating and COoling Curves
Week 8	Density	Density
Week 9	Density	Density
End of First Quarter		
Week 10	Gases	Gases
Week 11	Gas Laws and KMT	Gas Laws and KMT
Week 12	Atoms, Elements, Molecules and Compounds	Atoms Elements, Molecules and Compounds
Week 13	Classifying Matter	Separation Techniques
Week 14	Chemical and Physical Changes	Building Molecules
Week 15	Review Week	
Thanksgiving Break		
Week 16	Atomic Structure	Atomic Structure
Week 17	Atomic Theory	Build an Atom
Week 18	Exam Week	
End of Second Quarter/Fall Semester		
Winter Break		

Week 19	The Periodic Table	The Periodic Table
Week 20	The Periodic Table and Energy Levels	The Periodic Table and Energy Levels
Week 21	Covalent Bonding	Covalent Bonding
Week 22	Ionic Bonding	Ionic Bonding
Week 23	Lewis Dot Diagrams	Lewis Dot Diagrams
Week 24	Polar Molecules	Polar Molecules
Week 25	Surface Tension	Surface Tension
Week 26	Solubility	Solubility
End of Third Quarter		
Spring Break		
Week 27	Chemical Reactions	Chemical Reactions
Week 28	Reaction Kinetics and Precipitates	Reaction Kinetics and Precipitates
Week 29	Energy Changes in Chemical Reactions	Energy Changes in Chemical Reactions
Week 30	pH and Color Change	pH and Color Change
Week 31	Neutralizing Acids and Bases	Neutralizing Acids and Bases
Week 32	Chemistry of Life	Chemistry of Life
Week 33	Chemistry of Industry	Chemistry of Industry
Week 34	Science Fair	Science Fair
Week 35	Review and Exam Week	

The Well-Trained Mind Academy
Physics for the Logic Stage

Course Blackboard site: wtma.blackboard.com

Required Texts

- [*Holt Science & Technology: Student Edition Physical Science. ISBN 978-0030462283*](#)

Please make sure you have taken [the math pre-test](#) before signing up for this course.

Course Description

Physics for the Logic Stage provides an exploration of the field of physics while teaching the basics of the scientific method. Throughout the year, we will address the concepts of forces and motion, friction and gravity, pressure and work, energy, thermodynamics, sound, light, simple machines, electricity and magnetism.

Many of the concepts we explore build on each other making it essential for students to continually reflect on their understanding of the content. Students will be expected to demonstrate connections through narrative summaries, mathematical problem solving, and experimental design; to complete several independent and group projects; to develop and refine their observation and critical thinking skills and to practice working independently as well as in groups as they design experiments, conduct scientific investigations, develop skills in collecting and interpreting data, and write up reports.

In order to be successful, you must complete all assignments, be reflective of your understanding, collaborate and participate in class, and most importantly, ask for help if needed.

Assignments

Students will complete both individual lab reports and group lab reports, where two, three or four students will collaborate on a specific topic. Students will also complete narrative summaries associated with a specific topic. In addition, there will be two research-based projects to be carried out individually. Lab reports (individual and group) as well as narrative summaries are worth 40% of the final grade.

5 Independent Labs are each worth 4% for a total of 20%.

4 Group Labs are each worth 2.5% for a total of 10%.

5 Narrative Summaries are each worth 2% for a total of 10%.

Tests

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Mid-Year & Final Evaluations

The Mid-Year Evaluation will be a Blackboard based multiple choice examination on material covered from the beginning of the course through the end of the fall semester. The Final Evaluation will be a Blackboard based multiple choice examination on material covered from the beginning of the second semester through the end of the course. More detail will be provided on these assessments during the fall and spring semesters. Each evaluation is worth 10% of the final grade.

Famous Physicist Report

During the fall semester, students will be assigned a physicist and will conduct preliminary research, create an outline, write a rough draft, and then turn in a final report, with feedback from the instructor along the way. The report should be at least 200 words. This project is worth 10% of the overall grade.

Science Fair Project

During the spring semester, students will be given a choice of five topics and develop a science fair project that will require them to work through the scientific method from start to finish. This project is worth 10% of the overall grade.

Grading breakdown

Assignments (individual/group lab reports and narrative summaries): 40%

Test 1: 10%

Test 2: 10%

Mid-Year Evaluation: 10%

Final Evaluation: 10%

Famous Physicist Report: 10%

Science Fair Project: 10%

Example schedule:

<u>FALL SEMESTER</u>	<u>SPRING SEMESTER</u>
<p><u>TOPIC 1: Weeks 1 - 3</u> The Scientific Method Resultant Force and Net Force Newton's 3 Laws of Motions Calculate Force Group Lab: Investigating Newton's Three Laws.</p>	<p><u>TOPIC 6: Weeks 18 - 20</u> Simple Machines Lever Wheel and Axle Inclined Plane Wedge and Screw Pulley and Gear Group Lab: Simple Machines</p>
<p><u>TOPIC 2: Weeks 4 - 6</u> Friction Gravity Mass and Weight Calculate Weight</p>	<p><u>TOPIC 7: Weeks 21 - 23</u> Energy Conversion Laws of Thermodynamics Heat Transfer Temperature Celsius to Fahrenheit</p>

Individual Lab: How does friction affect movement?	Calculate Specific Heat Capacity Individual Lab: Do different types of foods contain different amounts of energy?
<u>FALL INDIVIDUAL PROJECT:</u> Famous Physicist Biography	<u>SPRING INDIVIDUAL PROJECT:</u> Science Fair
<u>TEST 1</u>	<u>TEST 2</u>
<u>TOPIC 3: Weeks 7 - 9</u> Energy Potential & Kinetic Energy Forms of Energy Energy Sources Calculate Work Group Lab: Building and testing a solar oven	<u>TOPIC 8: Weeks 24 - 27</u> Engines Calculating Power Conductors and Insulators Batteries Magnetism Calculate Potential Difference Group Lab: Can organic materials conduct electricity?
<u>TOPIC 4: Weeks 10 - 12</u> Speed Velocity Acceleration Speed-Time Graph Calculate Speed. Individual Lab: Will the height of the ramp affect a car's speed?	<u>TOPIC 9: Weeks 28 - 30</u> Sound and Sound Waves Calculate Speed of Waves Light and Vision Reflection and Refraction Individual Lab: Make a tonoscope.
<u>TOPIC 5: Weeks 13 - 16</u> Pressure Pascal's Law Calculate Pressure Group Lab: What affects the pressure exerted by a fluid?	<u>Weeks 31 - 33</u> Science Fair Presentation Review for Final Evaluation
<u>MID YEAR EVALUATION: Week 17</u>	<u>FINAL EVALUATION: Week 34</u>

Well-Trained Mind Academy
Diagnostic Test
Physics for the Logic Stage

Instructions

This placement test can help you determine whether your student has the prerequisite math knowledge for success in Physics for the Logic Stage.

The student should work independently without the use of a calculator. If special accommodations are required, the instructor should be notified. It is not necessary to time the test.

Please write neatly. Illegible answers will be assumed to be incorrect.

The student is most likely ready for PFLS if he/she scores a minimum of 70% on this placement test.

If the student's score falls below this level, it is advisable to contact the Dean at info@wtmacademy.com before registering for PFLS.

Test

Multiply or divide.

$$(1) \begin{array}{r} 8,120 \\ \times 17 \\ \hline \end{array}$$

$$(2) \begin{array}{r} 112.1 \\ \times 2.5 \\ \hline \end{array}$$

$$(3) 68,730 \div 5 = ?$$

$$(4) 44.45 \div 3.5 = ?$$

$$(5) \text{Reduce to lowest term } \frac{369}{1203} = ?$$

$$(6) 9.687 + 1.943 + 0.76 + 24.2 = ?$$

$$(7) 3.5 \text{ meters} = \underline{\hspace{2cm}} \text{ centimeters.}$$

(8) What is the **mean** of 34, 42, 17, 67 and 30?

(9) Round 47.948 to the **nearest whole number**.

$$(10) 20,000 + 3,400,000 = ?$$

Write your answer to this question in scientific notation.

Answer Key

- (1) 138,040
- (2) 280.25
- (3) 13,746
- (4) 12.7
- (5) 123/401
- (6) 36.59
- (7) 350 cm
- (8) 38
- (9) 48
- (10) 3.42×10^6