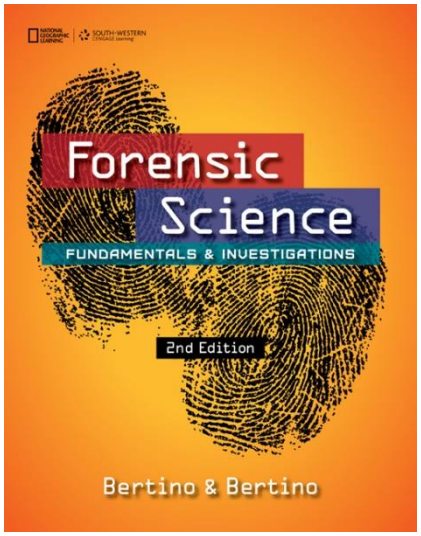

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correlation to

Georgia
Georgia Performance Standards (GPS),
Science; Forensic Science
Grades 9-12

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Forensic Science The Forensic Science curriculum is designed to build upon science concepts and to apply science to the investigation of crime scenes. It serves as a fourth year of science for graduation and may serve in selected Career Technology programs. Students will learn the scientific protocols for analyzing a crime scene, how to use chemical and physical separation methods to isolate and identify materials, how to analyze biological evidence and the criminal use of tools, including impressions from firearms, tool marks, arson, and explosive evidence.	
Co-Requisite – Characteristics of Science	
Habits of Mind	
SCSh1. Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.	
a. Exhibit the above traits in their own scientific activities.	Students are encouraged to use curiosity and honesty in conducting all laboratory activities: 39–50, 67–78, 96–111, 137–159, 175–189, 212–231, 250–283, 333–349, 370–387, 406–417, 433–443, 467–483, 501–517, 536–559, 574–585, 604–618, Capstone Projects: 619–658
b. Recognize that different explanations often can be given for the same evidence.	152, 210, 252, 260, 305, 382, 383, 403, 465, 469 Digging Deeper: 26, 28
c. Explain that further understanding of scientific problems relies on the design and execution of new experiments which may reinforce or weaken opposing explanations.	17, 18–19, 70, 98, 103, 136, 140, 154, 173, 178, 179, 254, 260, 264, 302, 369, 374, 376, 380, 413, 431, 533
SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.	
a. Follow correct procedures for use of scientific apparatus.	Students use various laboratory equipment and follow explicit step–by–step directions in all laboratory activities: 39–50, 67–78, 96–111, 137–159, 175–189, 212–231, 250–283, 333–349, 370–387, 406–417, 433–443, 467–483, 501–517, 536–559, 574–585, 604–618, Capstone Projects: 619–658
b. Demonstrate appropriate technique in all laboratory situations.	Students use various laboratory equipment in performing all hands–on laboratory activities: 39–50, 67–78, 96–111, 137–159, 175–189, 212–231, 250–283, 333–349, 370–387, 406–417, 433–443, 467–483, 501–517, 536–559, 574–585, 604–618, Capstone Projects: 619–658

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c. Follow correct protocol for identifying and reporting safety problems and violations.	Students are given safety protocol for all hands–on activities: 39–50, 67–78, 96–111, 137–159, 175–189, 212–231, 250–283, 333–349, 370–387, 406–417, 433–443, 467–483, 501–517, 536–559, 574–585, 604–618, Capstone Projects: 619–658
SCSh3. Students will identify and investigate problems scientifically.	
a. Suggest reasonable hypotheses for identified problems.	32, 92, 140
b. Develop procedures for solving scientific problems.	17, 18–19, 70, 98, 103, 136, 140, 154, 173, 178, 179, 254, 260, 264, 302, 369, 374, 376, 380, 413, 431, 533,
c. Collect, organize and record appropriate data.	Students collect and organize data while conducting all laboratory activities: 39–50, 67–77, 96–109, 137–157, 175–189, 212–229, 250–281, 333–347, 370–385, 406–415, 433–441, 467–483, 501–517, 536–559, 574–585, 604–618, Capstone Projects: 619–658
d. Graphically compare and analyze data points and/or summary statistics.	This objective is addressed throughout. For example, see: students compile, compare and analyze data, examples: 67, 69, 71–75, 101, 102–103, 139, 152–154, 173–174, 175–176, 189, 212–213, 214–216, 218–219, 257–260, 269–270, 300–302, 308–313
e. Develop reasonable conclusions based on data collected.	9–10, 18, 71, 73, 74, 75, 105, 140, 142, 218, 228, 259, 302, 337–338, 476–477
f. Evaluate whether conclusions are reasonable by reviewing the process and checking against other available information.	9–10, 18, 71, 73, 74, 75, 105, 140, 142, 218, 228, 259, 302, 337–338, 476–477
SCSh4. Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.	
a. Develop and use systematic procedures for recording and organizing information.	Students collect and organize data while conducting all laboratory activities: 39–50, 67–77, 96–109, 137–157, 175–189, 212–229, 250–281, 333–347, 370–385, 406–415, 433–441, 467–483, 501–517, 536–559, 574–585, 604–618, Capstone Projects: 619–658
b. Use technology to produce tables and graphs.	Students collect and organize data while conducting all laboratory activities: 39–50, 67–77, 96–109, 137–157, 175–189, 212–229, 250–281, 333–347, 370–385, 406–415, 433–441, 467–483, 501–517, 536–559, 574–585, 604–618, Capstone Projects: 619–658

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c. Use technology to develop, test, and revise experimental or mathematical models.	Students collect and organize data while conducting all laboratory activities: 39–50, 67–77, 96–109, 137–157, 175–189, 212–229, 250–281, 333–347, 370–385, 406–415, 433–441, 467–483, 501–517, 536–559, 574–585, 604–618, Capstone Projects: 619–658
SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.	
a. Trace the source on any large disparity between estimated and calculated answers to problems.	9–10, 18, 71, 73, 74, 75, 105, 140, 142, 218, 228, 259, 302, 337–338, 476–477
b. Consider possible effects of measurement errors on calculations.	9–10, 18, 71, 73, 74, 75, 105, 140, 142, 218, 228, 259, 302, 337–338, 476–477
c. Recognize the relationship between accuracy and precision.	The opportunity to address this objective exists. For example, see: 5–7, 143, 149, 161, 164, 166, 246, 570, 600
d. Express appropriate numbers of significant figures for calculated data, using scientific notation where appropriate.	This objective is not directly addressed in this edition of Forensic Science: Fundamentals & Investigations.
e. Solve scientific problems by substituting quantitative values, using dimensional analysis and/or simple algebraic formulas as appropriate.	This objective is not directly addressed in this edition of Forensic Science: Fundamentals & Investigations.
SCSh6. Students will communicate scientific investigations and information clearly.	
a. Write clear, coherent laboratory reports related to scientific investigations.	This objective is addressed throughout. For example, see: students collect, organize and analyze data while conducting laboratory activities: 39–50, 67–77, 96–109, 137–157, 175–189, 212–229, 250–281, 333–347, 370–385, 406–415, 433–441, 467–483, 501–517, 536–559, 574–585, 604–618, Capstone Projects: 619–658
b. Write clear, coherent accounts of current scientific issues, including possible alternative interpretations of the data.	Throughout text, examples: 73, 76, 98, 141–143,144–146,154,180,186,189, 209, 254–256, 304–305, This objective is addressed throughout. For example, see: students collect, organize and analyze data while conducting laboratory activities: 39–50, 67–77, 96–109, 137–157, 175–189, 212–229, 250–281, 333–347, 370–385, 406–415, 433–441, 467–483, 501–517, 536–559, 574–585, 604–618, Capstone Projects: 619–658

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c. Use data as evidence to support scientific arguments and claims in written or oral presentations.	Throughout text, examples: 73, 76, 98, 141–143,144–146,154,180,186,189, 209, 254–256, 304–305,
d. Participate in group discussions of scientific investigation and current scientific issues.	Throughout text, examples; 8, 14, 15, 16, 94, 106, 144–146, 151, 180, 218, 219, 248, 269, 304–306
The Nature of Science	
SCSh7. Students analyze how scientific knowledge is developed.	
Students recognize that:	
a. The universe is a vast single system in which the basic principles are the same everywhere.	This objective is not directly addressed in this edition of Forensic Science: Fundamentals & Investigations.
b. Universal principles are discovered through observation and experimental verification.	This objective is not directly addressed in this edition of Forensic Science: Fundamentals & Investigations.
c. From time to time, major shifts occur in the scientific view of how the world works. More often, however, the changes that take place in the body of scientific knowledge are small modifications of prior knowledge. Major shifts in scientific views typically occur after the observation of a new phenomenon or an insightful interpretation of existing data by an individual or research group.	The opportunity to address this objective exists. For example, see: 22, 52–53, 113–114, 160–161, 202–204, 232, 238, 285, 316, 352–253, 418–419, 586–587, 633, Case Study examples: 10–11, 34, 61–62, 90–91, 131–132, 170, 202–206
d. Hypotheses often cause scientists to develop new experiments that produce additional data.	This objective is addressed throughout. For example, see: students hypothesize, design experiments, and compile data: 17, 18–19, 67, 69, 70, 71–75, 98, 101, 102–103, 136, 139, 140, 152–154, 173–174, 175–176, 178, 179, 189, 212–213, 214–216, 218–219, 254, 257–260, 264, 269–270, 300–302, 308–313, 369, 374, 376, 380, 413, 431, 533
e. Testing, revising, and occasionally rejecting new and old theories never ends.	This objective is addressed throughout. For example, see: students compile, compare and analyze data, examples: 67, 69, 71–75, 101, 102–103, 139, 152–154, 173–174, 175–176, 189, 212–213, 214–216, 218–219, 257–260, 269–270, 300–302, 308–313
SCSh8. Students will understand important features of the process of scientific inquiry.	
Students will apply the following to inquiry learning practices:	
a. Scientific investigators control the conditions of their experiments in order to produce valuable data.	18–19, 28–29, 129, 189, 251–253, 300–302, 308–313, 320

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b. Scientific researchers are expected to critically assess the quality of data including possible sources of bias in their investigations' hypotheses, observations, data analyses, and interpretations.	This objective is addressed throughout. For example, see: students compile, compare and analyze data, examples: 67, 69, 71–75, 101, 102–103, 139, 152–154, 173–174, 175–176, 189, 212–213, 214–216, 218–219, 257–260, 269–270, 300–302, 308–313
c. Scientists use practices such as peer review and publication to reinforce the integrity of scientific activity and reporting.	144, 145, 209, 254–256, 320–322, 619–622
d. The merit of a new theory is judged by how well scientific data are explained by the new theory.	The opportunity to address this objective exists. For example, see: 62
e. The ultimate goal of science is to develop an understanding of the natural universe which is free of biases.	This objective is not directly addressed in this edition of Forensic Science: Fundamentals & Investigations.
f. Science disciplines and traditions differ from one another in what is studied, techniques used, and outcomes sought.	Careers in Forensics, examples: 12, 35, 63, 92, 133, 171, 207, 246, 296, 330, 366, 401, 429, 463, 497, 532, 570
SCSh9. Students will enhance reading in all curriculum areas by:	
a. Reading in all curriculum areas	
Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas.	The opportunity to address this objective exists. For example, see: 8, 14, 15, 16, 94, 106, 144–146, 151, 180, 218, 219, 248, 269, 304–306
Read both informational and fictional texts in a variety of genres and modes of discourse.	The opportunity to address this objective exists. For example, see: Further reading for CCSS literacy details additional reading references. Available with Forensic Science Fundamentals & Investigations
Read technical texts related to various subject areas.	The opportunity to address this objective exists. For example, see: Digging Deeper, examples: 5, 8, 28, 59, 82, 84, 86, 127, 131, 168, 195, 201, 202, 206, 287, 288, 290, 293, 316, 320, 324, 329, 324
b. Discussing books	
Discuss messages and themes from books in all subject areas.	Discussion, The opportunity to address this objective exists. For example, see: 8, 14, 15, 16, 94, 106, 144–146, 151, 180, 218, 219, 248, 269, 304–306
Respond to a variety of texts in multiple modes of discourse.	Digging Deeper, examples: 5, 8, 28, 59, 82, 84, 86, 127, 131, 168, 195, 201, 202, 206, 287, 288, 290, 293, 316, 320, 324, 329, 324
Relate messages and themes from one subject area to messages and themes in another area.	The opportunity to address this objective exists. For example, see: Topical Science Keys, examples: 3, 21, 51, 79, 111, 159, 191, 231, 283, 315, 349, 387

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Evaluate the merit of texts in every subject discipline.	The opportunity to address this objective exists. For example, see: Topical Science Keys, examples: 3, 21, 51, 79, 111, 159, 191, 231, 283, 315, 349, 387
Examine author's purpose in writing.	The opportunity to address this objective exists. For example, see: 337–339
Recognize the features of disciplinary texts.	The opportunity to address this objective exists. For example, see: iv–v
c. Building vocabulary knowledge	
Demonstrate an understanding of contextual vocabulary in various subjects.	The opportunity to address this objective exists. For example, see: Topical Science Keys, examples: 3, 21, 51, 79, 111, 159, 191, 231, 283, 315, 349, 387
Use content vocabulary in writing and speaking.	26, 28, 66, 73, 76, 84, 132, 142–143,144–146, 206, 256, 262, 329, 375, 415, 424, 431, 565, 597
Explore understanding of new words found in subject area texts.	The opportunity to address this objective exists. For example, see: Topical Science Keys, examples: 3, 21, 51, 79, 111, 159, 191, 231, 283, 315, 349, 387
d. Establishing context	
Explore life experiences related to subject area content.	Case Study, examples: 10–11, 34, 61–62, 90–91, 131–132, 170, 202–206
Discuss in both writing and speaking how certain words are subject area related.	Vocabulary and use, examples: 3, 13–15, 21, 36–38, 51, 64–66, 79, 93–95, 106, 111, 134–136, 159, 172–174, 560, Discussion: 8, 14, 15, 16, 94, 106, 144–146, 151, 180, 218, 219, 248, 269, 304–306
Determine strategies for finding content and contextual meaning for unknown words.	The opportunity to address this objective exists. For example, see: 196
Co-Requisite – Content	
SFS1. Students will recognize and classify various types of evidence in relation to the definition and scope of Forensic Science.	
a. Compare and contrast the history of scientific forensic techniques used in collecting and submitting evidence for admissibility in court (e.g. Locard's Exchange Principle, Frye standard, Daubert ruling).	22, 52–53, 113–114, 160–161, 202–204, 232, 238, 285, 316, 352–253, 418–419, 586–587, 633, Case Study examples: 10–11, 34, 61–62, 90–91, 131–132, 170, 202–206

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b. Distinguish and categorize physical and trace evidence (e.g. ballistics, drugs, fibers, fingerprints, glass, hair, metal, lip prints, soil, and toxins).	22, 23, 110, 132, 416, 418, 424–426, 484, 493–494, 519, 619–622,
c. Determine the proper techniques to search, isolate, collect, and record physical and trace evidence.	24–31, 58, 80–87, 122–123, 195, 493–494, 528, 563–565, 623–630
d. Evaluate the relevance of possible evidence at the site of an investigation.	Capstone Projects: 619–622, 649–650
e. Organize relevant information to accurately develop and submit both scene and analysis reports.	Capstone Projects: 619–622, 649–650
SFS2. Students will use various scientific techniques to analyze physical and trace evidence.	
a. Identify and utilize appropriate techniques used to lift and evaluate readable, latent, plastic and visible fingerprints.	167, 175–189
b. Analyze the morphology and types of hair, fibers, soil and glass.	66–77, 96–109, 432–441, 501–515
c. Evaluate how post mortem changes are used to determine probable time of death:	
Rigor mortis	392–393
Livor mortis	391–392
Algor mortis	390–391
Gastric contents	395–396, 400
d. Identify methods used for the evaluation of handwriting and document evidence.	316–347
e. Determine the appropriate uses of chromatography and spectroscopy in evidence analysis.	52, 81, 286, 321
SFS3. Students will analyze the use of toxicology, serology, and DNA technology in forensic investigations.	
a. Classify toxins and their effects on the body.	284–293

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b. Compare the effects of alcohol on blood alcohol levels with regard to gender, and according to the law.	292–293
c. Evaluate forensic techniques used to isolate toxins in the body.	285–286
d. Differentiate the forensic techniques used to distinguish human and animal blood	
e. Analyze the physics of blood stain patterns.	238–244
f. Compare short tandem repeat patterns (STR) and relate to identifying the DNA of an individual.	197–201
g. Explain the use of the DNA database for DNA profiling.	192, 203
SFS4 Students will evaluate the role of ballistics, tool marks and evidence of arson in forensic investigation.	
a. Identify firearm lab tests used to distinguish the characteristics of ballistics and cartridge cases.	589–593, 596–597
b. Analyze the physics of ballistic trajectory to predict range of firing.	594–596
c. Recognize the forensic significance of tool marks, footwear and tire impressions in an investigation.	2, 518–557, 560–583
d. Evaluate possible indicators of arson and criminal bombing.	The opportunity to address this objective exists. For example, see: 27, 32, 245, 492
SFS5 Students will evaluate the role of Forensics as it pertains to Medicolegal Death Investigation.	
a. Identify various causes of death (blunt force trauma, heart attack, bleeding, etc.).	117–118, 285, 287–288, 294, 386, 389–390, 456, 530
b. Analyze evidence that pertains to the manner of death (natural, homicide, suicide, accidental, or undetermined).	117–118, 284–285, 287, 288, 291, 292, 294, 386, 394–400, 406–415, 456, 458, 530