



Science in *Forensic Science: Fundamentals & Investigations 2e*

BIOLOGY

Biology is the study of life and living things. Forensic science deals with many of the underlying themes of biology, such as cell structure and function, life processes, and human systems. In addition, forensic scientists study not only human biology but also that of plants, animals, and fungi. This information is necessary when drawing conclusions about evidence and other findings. Some of the biology concepts taught in *Forensic Science: Fundamentals & Investigations 2e* by Bertino and Bertino (ISBN 9781305077119) include:

- Life cycles—of cells and organisms 56, 124–127, 354–357, 358
- Processes of death (human) 390
- Algor mortis, livor mortis, rigor mortis 390–393
- Process of decomposition (human) 390–398
- Inheritance (meiosis, mitosis, independent assortment) 198
- Blood types 233–237
- Structures and functions of body tissues and organs 50–59 (hair), 193–194 (DNA), 233–235 (blood), 445–446 (bones)
- Botany 124–127
- Palynology (study of pollen) 123–125
- Human organs and systems
 - Skin 53, 162, 164, 168, 291–293
 - Circulatory system 233–235, 291–293
 - Digestive system 118, 292, 293, 386, 395–396, 396 (autopsy), 400
 - Central nervous system 291–293
- DNA 60, 168, 193–195, 196, 197, 203, 527, 528
- Effects of drugs (including alcohol) on human systems 282, 284, 287, 289–293
- Effects of poisons and toxins on human systems 284, 287, 287–289
- Biometrics 168, 321
- Biological forensic evidence (including autopsy) 52, 53, 58–60 (hair); 113–123 (forensic botany); 127–130 (forensic palynology); 195–201 (DNA); 233, 238–244 (blood); 286–287, 293 (toxicology); 350–363 (forensic entomology); 394–396 (autopsy)
- Entomology 353, 355–361

EARTH SCIENCE

Earth science is the study of Earth and its structure; it encompasses many other sciences, including geology, meteorology, oceanography, and astronomy. The Earth science concepts taught in *Forensic Science: Fundamentals & Investigations 2e* focus on geology and meteorology. Earth science topics include:

- Mineral and chemical composition of soils 419, 421–423
- Soil profiles 419–420

- Weathering and other agents of change 420, 421
- Weather effects on evidence, crime scenes, decomposition 355, 360-361, 362
- Soil effects on evidence, crime scenes, decomposition 423–426

CHEMISTRY

Chemistry is the study of the composition, structure, properties, and reactions of matter, especially at the atomic and molecular levels. Chemistry concepts taught in *Forensic Science: Fundamentals & Investigations 2e* include:

- Atomic structure 82, 484, 489–490
- Chemical/Biochemical analysis of evidence
 - Fibers 82–87
 - Drugs 284–287, 293
 - Toxins 284-287
 - Heavy metals, poisons 284-287, 288
 - Polymers (including PCR) 60, 82, 83, 85, 193, 195, 207
 - Papers, inks, glue. 322–323, 325
 - Hair 52–53, 59–60
 - Blood 236
 - Glass 494
 - Amino acids 53–54, 196–199
 - DNA 192, 193, 195–200, 201, 207, 212
 - Use of enzymes 60, 196, 212
- Chemicals used in forensic science *included in Chemical/Biochemical analysis of evidence*
- pH 390, 393, 419, 422–423, 425
- Biochemistry 53–54, 60, 193–194, 207, 233–236, 446
 - Addiction 282, 289, 290–293
 - Dependency 290
 - Cell death 390
 - Decomposition 396–398
 - The molecular structure of DNA 193

PHYSICS

Physics is the study of energy and matter and how they are related. As with chemistry, much of physics focuses on the atomic and molecular levels. Physics concepts taught in *Forensic Science: Fundamentals & Investigations 2e* include:

- Properties of light 59, 81, 83, 321, 487–489, 494, 511-515
- Wave length 81, 321
- Surface tension, cohesion, adhesion 238–239
- Gravity 238, 239, 392, 594
- Aerodynamics 526–527, 594
- Forces on movement 166–167, 205
- Refractive index 487–489, 494, 511-515
- Stretching and compression 89, 102–103, 489–490
- Inertia 594
- Kinetic energy 590, 594
- Acceleration 526
- Velocity 238, 240, 242–243, 527

- Simple machine (crowbar) 560–561, 565
- Law of motion (third) 592

SCIENCE SKILLS

In addition to the concepts from the specific science disciplines listed above, forensic science includes several general science concepts. General science skills taught in *Forensic Science: Fundamentals & Investigations 2e* include:

- Observation 4–9, 15–19
- Use of science tools 58–59 (microscopes intro, then *throughout*), 30–31, 43–49, 120, 147–151, 322, 574–576, 577–580, 651–654, 655–658
- Assimilation of material from primary sources (including scholarly journals) *throughout*

MATHEMATICS

Forensic science requires an understanding of key mathematical concepts. The mathematics concepts taught in *Forensic Science: Fundamentals & Investigations 2e* include:

- Arithmetic *throughout*
- Using mathematical formulas *throughout*
- Solving algebraic equations 243–244, 416–429
- Reading and creation of tables, graphs, scatter plots *throughout*
- Probability 200, 236–237
- Calculating ratios 57, 242–243, 269–270, 272–275, 279–280, 318, 333–335, 336–339, 510, 525
- Calculating rates 56, 59, 390–393, 406–415
- Simple statistics 235, 237, 289, 411–412
- Trigonometric functions (sine and tangent) 242–243, 269–270, 272–275, 279–280, 510, 525
- Temperature change 391, 408–410, 411–412
- Height and weight calculations 411–412, 454–456, 459–460, 461–462, 470–474, 475, 476–477, 478–481, 522–523, 540–542
- Density 486–487, 504–506
- Diameter, radius, circumference, area of a circle 57, 84, 86, 139–140, 257–260, 524–525, 543–546
- Using map scales 25, 43–49, 122, 147–151
- Pythagorean theorem 269–270, 606

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