Key Concepts of Chapter 7:

- A microscope is an optical instrument that uses a lens or a combination of lenses to magnify and resolve the fine details of an object
- In the basic compound microscope, the object to be magnified is placed under the lower lens, called the objective lens, and the magnified image is viewed through the upper lens, known as the eyepiece lens
- The comparison microscope consists of two independent objective lenses joined by an optical bridge to a common eyepiece lens. When a viewer looks through the eyepiece lens, the objects under investigation are observed side by side in a circular field that is equally divided into two parts
- Modern firearms examination began with the introduction of the comparison microscope, which gives the examiner a side-by-side magnified view of bullets
- The stereoscopic microscope consists of two monocular compound microscopes properly spaced and aligned to present a three-dimensional image of a specimen to the view, who looks through both eyepiece lenses
- The large working distance of the stereoscopic microscope makes it ideal for microscopic examination of big, bulky items
- Light that is confined to a single plane of vibration is said to be plane-polarized
- The polarizing microscope made possible the examination of the interaction of plane-polarized light with matter
- Polarizing microscopy is used to study birefringent materials, that is, materials that have a double refraction. Refractive-index data provides information that helps identify minerals present in a soil sample or the identity of a synthetic fiber
- The microspectrophotometer is a spectrophotometer coupled with a light microscope. The device allows an examiner studying a specimen under the microscope to obtain the visible absorption spectrum or IR spectrum of the material being observed
- The scanning electron microscope (SEM) bombards a specimen with a beam of electrons instead of light to produce a highly magnified image. This produces x-ray emissions that can be used to characterize elements present in the material under investigation

Key Concepts of Chapter 10:

- Hair is an appendage of the skin that grows from an organ called the hair follicle, continues into a shaft, and terminates at a tip end
- The shaft—which is composed of three layers called the cuticle, cortex, and medulla—is subjected to the most intense examination by the forensic analyst
- When comparing strands of hair, the analyst is particularly interested in matching the color, length, and diameter. The comparison microscope is an indispensable tool for comparing these characteristics
- A careful microscopic exam of hair can distinguish between human and animal hair
• Scale structure, medullary index, and medullary shape are particularly important in hair identification. Other important features for comparing hair are the presence or absence of a medulla and the distribution, shape, and color intensity of the pigment granules present in the cortex
• The probability of detecting DNA in hair roots is more likely for hair being examined in its anagen or early growth phase as opposed to its catagen or telogen phase
• The follicular tag, a translucent piece of tissue surrounding the hair shaft near the root, is a rich source of DNA associated with hair. Mitochondrial DNA (mtDNA) can also be extracted from the hair shaft
• Microscopic hair exams tend to be subjective and highly dependent on the skills and integrity of the analyst. As a rule, all positive microscopic hair comparisons must be confirmed by DNA analysis
• Hair
  o Class Evidence: Morphology
  o Individualistic Evidence: DNA material
  o Trace Evidence: Difficult to see
• The quality of fiber evidence depends on the ability of the analyst to identify the origin of the fiber or to narrow the possibilities to a limited number of sources
• Microscopic comparisons between questioned and standard/known/reference fibers are initially undertaken for color and diameter characteristics. Other features that could be important in comparing fibers are striations on the surface of the fiber, the presence of delustering particles, and the cross-sectional shape of the fiber
• The visible-light microspectrophotometer is a convenient tool for analysts to use to compare the colors of fibers through spectral patterns
• Infrared spectrophotometry and the polarizing microscope are other reliable methods for identifying the generic class of fibers
• Hairs and Fibers are found at a wide variety of crime scenes and can be found on persons associated with said crime scenes
• Special care must be taken during the location and collection of hair… why do you think that is?

REFERENCE