

# NRPM 104: Anatomy and Physiology for Emergency Medical Care Syllabus

[Semester and year]



## Instructor information

Instructor	Email Address	Office hours
Paula Johnson	Paula.johnson@princetonrescue.com	Vary

## General information

### Description

Students will integrate complex depth and comprehensive breadth of knowledge of the anatomy and physiology of all human systems to better identify the signs and symptoms associated with pathophysiology. *Co-Requisite: NRPM 104L*

### Expectations and goals

Upon Successful completion of this course, students will be able to:

- Develop a vocabulary of appropriate terminology to effectively communicate information related to anatomy and physiology
- Recognize the anatomical structures and explain the physiological functions of body systems.
- Recognize and explain the principles of homeostasis and the use of feedback loops to control physiological systems in the human body.
- Use anatomical knowledge to predict physiological consequences and use knowledge of function to predict the features of anatomical structures.
- Recognize and explain the interrelationships within and between anatomical and physiological systems of the human body.
- Synthesize ideas to make a connection between knowledge of anatomy and physiology and real-world situations including illness and injury leading to homeostatic imbalances.
- Communicate clearly and in a way that reflects knowledge and understanding of the human body and demonstrates the ability to adapt information to different audiences and applications.

## Course Delivery Method: In-Seat

## Course materials

### Required materials

- <https://canvas.instructure.com/>

### Optional materials

- Nancy Caroline's Emergency Care in the Streets; 8<sup>th</sup> edition, 2013 by Elling and Smith; Publisher Jones and Bartlett. ISBN: 978-1-284-13718-7
- Anatomy & Physiology for Emergency Care; 2<sup>nd</sup> edition, 2008 by Martini, Bartholomew, Bledsoe; Publisher Pearson/Prentice Hall. ISBN: 978-0-13-234298-8

### Required text

- Practical Anatomy & Physiology: Labs for the Advanced Level Provider; 1<sup>st</sup> edition, 2016 by Paula Johnson; Publisher KendallHunt. ISBN: 9781465294548

### Course schedule

Week	Topic	Class Session	Reflective Assignment
<b>PLEASE SEE TEAMUP CALENDAR FOR SCHEDULE DETAILS:</b> <a href="https://teamup.com/ksqsu19g123to895tj">https://teamup.com/ksqsu19g123to895tj</a>			

### Procedures for Evaluation

- A. \*Students must complete each NRPM course with a grade point average of at least 70%. Any student who does not have a 70% average at the completion of an NRPM course will not be allowed to continue in the program. The student's academic standing will be discussed with the student periodically throughout the program.
- B. If a student scores below a 70% on a NRPM Cumulative examination, the student will be required to retake the examination until a score of 70% is attained; however, the original score will stand as the recorded score.
- C. Individual skills that comprise a skill lab are mandatory per the National Registry of EMT's. A student must complete each skill with the minimum points required AND the established number of SUCCESSFUL attempts meeting those minimum point standards. A grade will be issued to the student based on their participation in lab sessions and their reporting in platinum planner.

**\*NOTE:** NRPM 202 is the exception to this policy. In this course, you must successfully complete each sub-specialty based on the criteria from each governing agency. The final grade issued for this course will be a "pass/fail." If the student is unable to receive a passing grade for this class, the student will NOT be allowed to continue in the Paramedic Program.

### Grading Components and Weights:

The Paramedic Program Student's Classroom Assessment grade will be the sum of the weighted scores comprising the parameters of course work outlined below.

Didactic Courses	
80%	Coursework <ul style="list-style-type: none"><li>• Quizzes - 30%</li><li>• Exams - 50%</li></ul>
20%	Monthly Behavioral Evaluations

## Grading Scale:

100-90 = A    89-80 = B    79-70 = C    69-60 = D    <59 = F

All students must maintain a C average in each course to continue throughout the program

## Attendance Policy

All material is important to your success; therefore, students absent more than 5% of the course without a valid excuse will be dismissed from the program of study.

There are two types of absences recognized as a “valid excuse” by Princeton Rescue Squad’s Education Department: (1) absence resulting from participation in an activity where you are officially representing the Education Department; and (2) absence caused by unforeseeable and unavoidable circumstance which is beyond your control. All other absences are considered willful and will not count as excused. It is your responsibility to provide your instructor with a proper explanation and documentation of these valid absences. It is the responsibility of the student to make up any work or testing missed. The missed (comparable) coursework and exams must be completed within 72 hours of the absence and prior to the last date of the class. Tardiness will not be tolerated. Any student who shows up later than 15 minutes into the beginning of a course or leaving a class session 30 minutes or more before the end of the class day will result in the mark of tardy on his/her record. An accumulation of 5 tardies will result in an unexcused absence.

Students may withdraw from the course at any time. Any student that misses more than two (2) consecutive class sessions without contacting the course instructor will be considered to have withdrawn from the course.

## Student Advisory and Evaluation

Faculty will routinely discuss student progress throughout the program of study at regular intervals (increments no longer than 25% of the program) to provide learners with adequate chances to take corrective actions. During these mandatory meetings with a student item(s) or subject(s) of concern to discuss may include, but are not limited to:

*Excessive absences and tardiness, failure to turn in assignments / clinical rotations on time, classroom / clinical behavior concerns, plagiarism, cheating, struggling or failure to maintain a GPA of 70%, etc.*

A Student Advisory Form will be filled out and signed by both the Faculty member addressing the concern, and the student. Once the concern has been documented, the Program Instructor and student will discuss possible resolutions to the problem and a proposed action plan will be written on the Advisory Form. The student may use the Advisory Form to record a rebuttal against the initial concern or proposed action plan. The instructor will then mark the form “unresolved” and forward it to the Education Director who investigate the matter and make a determination on a second Advisory Form. Copies of these completed Advisory Forms are available to the student; however, originals must and will be retained by the Education Program.

## Standards of Conduct Regarding Cell Phone Use

As adults, you are permitted to retain your cellular devices unless during testing. At that time, all cell phones must be placed in a bag away from your testing area or given to your instructor until the testing is complete. It is common during lecture for students to utilize their cell phones to look up information regarding topics discussed in the class session, and this practice is permitted. However, if the instructor or other member of the instructional or administrative staff see that cell phones are being used for other purposes (ie: facebook, messenger, etc.) during lecture, lab, or any other designated course activity then the following discipline policy will take place:

- First offense - verbal warning
- Second offense - written warning
- Third offense - dismissal from the program

## **Academic Dishonesty**

As a student and pre-hospital professional, you are expected to adhere to a professional code of conduct and not engage in plagiarism, cheating, falsifying information or records, or any other such activity. Failure to adhere to this code of conduct will result in disciplinary action up to and including dismissal from the program.

## **Grounds For Dismissal**

A student may be dismissed from the program for the following reasons:

1. Absenteeism greater than 1 unexcused class.
2. Receiving a “D” or “F” as a cumulative grade for the course.
3. Insubordination (in class, lab, or in clinical)
4. The conviction and/or known use of, distribution of, or possession of illegal drugs, or controlled substances.
5. Failure to accomplish clinical assignments and objectives
6. Unprofessional or unethical conduct
7. Cheating in related or professional EMS courses or in clinical documentation.

## **NRPM 104 Course Objectives:**

1. Understand the body’s topographic anatomy, including the anatomic position and the planes of the body.
2. List the planes and sections of the body, including frontal, sagittal, midsagittal, transverse, cross section, and longitudinal.
3. List and define terms related to specific areas of the body.
4. Explain the following directional terms: right, left, superior, inferior, lateral, medial, proximal, distal, superficial, deep, anterior (ventral), posterior (dorsal), palmar, plantar, and apex
5. Describe movement and positional terms including abduction, adduction, hyperflexion, and hyperextension.
6. Describe the prone, supine, Trendelenburg shock, Fowler, and recovery positions of the body.
7. Describe the topography of the abdominal region, including the four abdominal quadrants and the nine abdominal regions.
8. Discuss the atomic composition of the body, including bonding and chemical reactions.
9. Discuss the chemical composition of the body, including key substances: enzymes, carbohydrates, lipids, proteins, nucleic acids, and trace elements.
10. Discuss cell structure and function as it relates to the practice of paramedicine.
11. Describe the anatomy and physiology of the cell, as well as the cellular environment.

12. Discuss cell transport mechanisms, including diffusion, osmosis, facilitated diffusion, active transport, endocytosis, and exocytosis.
13. Discuss the life cycle of a cell, including interphase, mitosis, cytokinesis, and differentiation.
14. List and describe the types of tissues found in the body: epithelial tissue, connective tissue, muscle tissue, neural tissue, and membranes.
15. Discuss the anatomy and the physiology of the skeletal system, including types of bones, embryonic skeleton maturation, bone growth and maintenance and related hormones, major subdivisions of the skeleton, components of the skeleton, and classification and types of joints.
16. Discuss the anatomy and physiology of the muscular system, including gross and microscopic anatomy, actions of muscles, contraction of skeletal muscle fiber, and major muscles of the body.
17. Discuss the anatomy and physiology of the respiratory system, including the structure and function of the nasal cavities, pharynx, larynx, speaking mechanism, trachea, bronchial tree, lungs, alveoli, and pulmonary capillaries.
18. Describe the process of gas exchange in the alveoli.
19. Discuss the concept of respiration.
20. Discuss acid/base balance and how it relates to respiration.
21. Describe the concept of hypoxic drive.
22. Discuss the concept of ventilation, including pulmonary volumes and diffusion of gases.
23. Explain the brainstem's role in regulating respiration.
24. Explain how the level of carbon dioxide in the blood and the blood's pH relate to ventilation.
25. Discuss the anatomy and physiology of the circulatory system, including the composition and function of blood, the heart, and the blood vessels, as well as the blood groups.
26. Discuss the concepts of afterload, stroke volume, and cardiac output
27. Discuss the Frank-Starling mechanism.
28. Discuss the anatomy and physiology of the lymphatic and immune system, including the formation of lymph, the locations and function of lymph nodes and the spleen, innate versus adaptive immunity, humoral versus cell-mediated immunity, acquired versus genetic immunity, and other mechanisms of protection including B cells, T cells, vaccinations, and flora.
29. Discuss the anatomy and physiology of the nervous system, including the central and peripheral nervous systems, as well as sensory function.
30. Describe the anatomy and physiology of the integumentary system, including function, layers of the skin, and other structures present in the skin.
31. Explain the anatomy and physiology of the digestive system, including general function, organs and structures involved in digestion, and the process of digestion.
32. Discuss the anatomy and physiology of the endocrine system, including endocrine and exocrine glands, chemistry of hormones, regulation of hormone secretion, and the roles of hormones in various processes in the body.
33. Describe the anatomy and physiology of the urinary system, including its components, general function, the process of urine formation, and the role of the kidneys in maintaining blood volume, blood pressure, pH, and electrolyte balance.
34. Explain the concept of fluid balance, as well as the purpose and mechanisms for maintaining homeostasis.
35. Discuss the anatomy and physiology of the genital system, including the hormones and structures involved in reproduction, the menstrual cycle, spermatogenesis and oogenesis, gestational changes, and fetal circulation and respiration.
36. Discuss the relationship between nutrition, metabolism, and body temperature, including methods of heat generation and loss, fever, the role of the hypothalamus, and cellular metabolism.

37. Define pathophysiology and discuss its scope.
38. Explain the function of each of the three main components of a human cell: the cell membrane, the cytoplasm, and the nucleus.
39. Discuss how the body maintains homeostasis.
40. Describe the characteristics of the four basic tissue types—epithelial, connective, muscle, and nerve tissue—and specify where each is found in the body.
41. Explain the function of common hormones, neurotransmitters, and electrolytes.
42. Compare atrophy, hypertrophy, hyperplasia, dysplasia, and metaplasia as means of cellular adaptation.
43. Analyze the functions of water in the body.
44. Explain the concepts of osmotic pressure and membrane permeability.
45. Explore the causes, clinical manifestations, assessment, and management of edema.
46. Survey the mechanisms by which fluid and electrolyte balance are maintained in the body.
47. Explain the physiologic consequences of imbalances in sodium, potassium, calcium, phosphate, and magnesium.
48. Become familiar with the concepts of acid, base, and pH.
49. Explain how proteins, phosphate ions, and bicarbonate ( $\text{HCO}_3^-$ ) buffer pH imbalances in the body.
50. Compare the four main clinical presentations of acid-base disorders: respiratory acidosis, respiratory alkalosis, metabolic acidosis, and metabolic alkalosis, and describe the clinical presentation that might be associated with a mixed acid-base disorder.
51. Outline how cellular injury occurs in patients with hypoxia, chemical exposures, infection (sepsis), immunologic exposures (hypersensitivity reactions), inflammatory conditions, genetic disorders, nutritional imbalances, physical damage (mechanical injury), and other harmful exposures, such as extremes of hot and cold.
52. Examine the concept of apoptosis.
53. Analyze the controllable and uncontrollable risk factors that intersect in order to cause disease.
54. Define perfusion, and explain the physiologic consequences of hypoperfusion.
55. Analyze the mechanisms by which the body compensates for hypoperfusion.
56. Discuss the causes of central and peripheral shock, including cardiogenic, obstructive, hypovolemic, and distributive shock.
57. Outline the management of a patient in shock.
58. Describe multiple organ dysfunction syndrome.
59. Examine the body's three lines of defense against pathogens: anatomic barriers, the immune response, and the inflammatory response.
60. List the functions of the five general types of white blood cells: basophils, eosinophils, monocytes, neutrophils, and lymphocytes.
61. Describe the function of macrophages.
62. Describe the function of mast cells.
63. Compare humoral immunity with cell-mediated immunity.
64. Explain how plasma protein systems—the complement system, the coagulation (clotting) system, and the kinin system—modulate the inflammatory response.
65. Compare wound healing by primary intention with wound healing by secondary intention.
66. Explain why hypersensitivity reactions sometimes occur, and outline the four types of hypersensitivity reactions.

67. List several autoimmune reactions, and explain blood group incompatibility.
68. List the stages of the general adaptation syndrome, and explore the relationship between stress and disease.

### Overview of Semester Class Schedule:

WEEK #	NRPM 101	NRPM 102	NRPM 102L	NPRM 103	NRPM 104	NRPM 104L	NRPM 106	NRPM 106L	Total hrs/day
1	5				2.5	0.83			8.33
2	5				2.5	0.83			8.33
3	5				2.5	0.83			8.33
4	5				2.5	0.83			8.33
5		2	3		2.5	0.83			8.33
6		2	3		2.5	0.83			8.33
7		2	3		2.5	0.83			8.33
8		2	3		2.5	0.83			8.33
9		2	3		2.5	0.83			8.33
10				2.2	2.5	0.83	1.2	1.6	8.33
11				2.2	2.5	0.83	1.2	1.6	8.33
12				2.2	2.5	0.83	1.2	1.6	8.33
13				2.2	2.5	0.83	1.2	1.6	8.33
14				2.2	2.5	0.83	1.2	1.6	8.33
15				2	2.5	0.83	1.4	1.6	8.33
16				2	2.5	0.85	2	1	8.35
17				2	2.5	0.85	1	2	8.35
18				2	2.5	0.85	0.6	2.4	8.35
	20	10	15	19	45	15	11	15	150

		Classes will meet on Tuesdays	
Course Legend:	Req. Hrs:	Start Time	End Time
NRPM 101: Introduction to Emergency Medical Care	20	1300	1800
NRPM 102: Medical Math and Pharmacological Principles	10	1300	1500
NRPM 102L: Pharmacological Techniques	15	1500	1800
NRPM 103: Introduction to Clinical Medicine & Assessment	19	1300	1515
NRPM 104: Anatomy & Physiology for Emergency Medical Care	45	900	1130
NRPM 104L: Anatomy & Physiology for Emergency Medical Care Lab	15	1130	1230
NRPM 106: Airway and Injury Management in the Field	11	1515	1630
NRPM 106L: Airway and Injury Management in the Field Lab	15	1630	1800
	150		