Course Title: Human Genetics/Genetic Screening
Credits: 1.0

Course Description: This course provides an introduction to the principles of genetics. Students are expected to master a basic understanding of how genetic traits are passed on and how the internal and external environment of the cell can affect this process. Emphasis is placed on understanding the effects of teratogens and the unique vulnerability of the fetus to maternal exposure during key periods in development. This course uses current research in midwifery and obstetrics to broaden the student’s understanding of the following NARM skills and MANA core competencies learned under clinical supervision:

Learning Activities:

A. Student reads appropriate sections from the Learning Materials/Resources.

B. Student answers the questions listed in the Learning Objectives by researching the Learning Materials/Resources for the course and correctly cites the sources and page numbers for each of their answers.

C. Student presents answers the questions listed in the Learning Objectives for review by preceptor.

D. Student participates in preceptor elaboration/discussion of Learning Objectives.

E. In the case that the required texts are more than 5 years old, the student must research, prepare & present a summary of current best midwifery care/practices appropriate to a topic covered in this course from a current journal article/study, less than 5 years old.

Learning Materials / Resources:
Please use textbooks less than 5 years old or most recent edition.


6. Students must find 1 article/study less than 5 years old. Recommended internet links as needed for latest developments in midwifery care:  
https://www.midwiferycollege.edu/resources-national-college-of-midwi

Evaluation Tools / Methods:  
**Minimum passing grade for each course is a cumulative 80% / B-. Students and preceptors are encouraged to work together until the student masters the information.**

Final grade for the course is based on preceptor evaluation of the following:

A. Learning Objectives count for 50% of the final grade.  
The preceptor evaluates each answer based on three elements:
   1. Answers should reflect a thorough review of current literature regarding best current practices in midwifery care.  
   2. Each answer should be formed in the student's own words or paraphrased from the text. The answer should be minimal, not a re-write of the entire text, but enough to show appropriate comprehension of the learning objective.  
   3. Student identification of sources and page numbers for each of the Learning Objectives. (Preceptor should do a random check to determine that sources cited are correctly identified.)

B. Enrichment Activities, including research essays and summaries of articles: 20%  
C. Discussions: 15%  
D. Tests and Exams: 15%  

Course credit:  
**One Academic credit equals approximately 15 hours of formal time plus 30 hours of additional study or homework. Formal time is defined as the amount of time taken to answer the Learning Objectives to the level of 80% and to complete any learning activities to the preceptor's satisfaction, including any time spent face to face with the preceptor. Informal time includes any time spent actively reading relevant sources and textbook/s, researching Learning Objectives, and studying for examinations.**

Learning Objectives:

A. The student must research, prepare & present a summary of an aspect of current best midwifery care/practices appropriate a topic from this course from a current journal article/study.

B. Student answers the questions below and cites the sources and page numbers.
   1. Define a gene.  
   2. Define genome.  
   3. Describe briefly how DNA is packaged into chromosomes.
4. Briefly describe how DNA is replicated.
5. Define mitosis.
6. Briefly describe how mitosis is related to the replication of genetic code.
7. Briefly describe how DNA directs protein synthesis.
8. Define phenotype.
10. Explain how two people might express the same phenotype but have different genotypes.
11. Define autosome.
12. Define sex chromosome.
13. Briefly describe the concept of alleles.
14. What is the term that describes a pair of alleles that are identical?
15. What is the term that describes a pair of alleles that are different from each other?
16. Describe what is meant by family pedigree and sketch a graphic representation of one.
17. Describe autosomal dominant inheritance.
18. Describe autosomal recessive inheritance.
19. Describe sex-linked inheritance.
20. Give an example of a sex-linked trait.
21. Describe fragile X-syndrome and how it is inherited.
22. Describe mitochondrial inheritance and briefly explain its significance.
23. Briefly describe how blood type is inherited.
24. Describe how nondisjunction leads to an abnormal number of chromosomes.
25. Define aneuploidy.
26. Describe how Trisomy 13 (Patau’s syndrome) affects the fetus.
27. Describe how Trisomy 18 (Edward’s syndrome) affects the fetus.

29. Explain what is meant by multifactorial inherited diseases.

30. Describe what is meant by a structural chromosomal abnormality.

31. Define a deletion.

32. Given an example of a syndrome resulting from a microdeletion.

33. Describe how a chromosomal translocation occurs.

34. Describe how a chromosomal duplication occurs.

35. Define chromosomal inversion.

36. Define teratogen.

37. Define the organogenetic period of development.

38. What is the significance of teratogenic effect on the organogenetic period?

39. What is the critical period for fetal brain development in which it is most susceptible to damage by teratogens?

40. How does a drug or substance become a proven teratogen?

41. Describe how alcohol acts as a teratogen.

42. Describe how DES (Diethylstilbestrol) acts as a teratogen.

43. Give an example of an antibiotic that is considered a teratogen.

44. Give an example of an anticoagulant drug that is a teratogen.

45. Describe the teratogenic effects of mercury.

46. Describe the teratogenic effects of lead.

47. Describe the teratogenic effects of PCBs.

48. Give an example of a virus that is a teratogen.

49. Describe how radiation is a teratogen.

50. Describe what is meant by a Category D drug.

51. Describe what is meant by a Category X drug.
52. Describe how alpha-fetoprotein (AFP) is used as a predictor of genetic defects.

53. Describe how amniocentesis provides an understanding of fetal genetics.

54. Describe how chorionic villi sampling provides an understanding of risk for fetal abnormality.

55. Briefly describe the effectiveness of using ultrasound to determine fetal genetic abnormality.

56. Briefly describe the overall frequency of live births that result in a baby with a genetic abnormality.

57. Briefly explain which parents are at a greater risk of having a baby with a genetic abnormality.

58. Describe how parental age has an effect on the likelihood of a fetus with a genetic abnormality.

59. Briefly discuss what type of screening is available for parents planning on having a child.