Midland College
Syllabus
Fall 2008
DMSO 2405
Sonography of Obstetrics and Gynecology
(4-1-0)

Course Description: Detailed study of the female pelvis and obstetrics/gynecology as related to scanning techniques, patient history and laboratory data, transducer selection, anatomy, pathology, pathophysiology, and scanning protocols.

Text, References, and Supplies: Hagen-Ansert, Sandra L., Textbook of Diagnostic Ultrasonography, Sixth edition, St. Louis: Mosby and companion workbook. Each student must purchase 6 brown scantron sheets (form 2052) at the bookstore.

Course Goals/Objectives: The following course goals will be addressed in the course. These goals are directly related to the performance objectives.

- explain maternal physiology as it occurs prior to fertilization
- describe the embryological development of the fetus, the fetal membranes and placenta
- define and describe appropriate patient communication, patient preparation, obtaining patient history and clinical indications for the obstetrical/gynecologic ultrasound exam
- identify normal pelvic anatomy on diagrams, photographs, models, and images taken with diagnostic x-rays, CT, MRI or Ultrasound in three-dimensions, sagittal, coronal, transaxial and oblique planes
- list and describe the various methods of fetal dating, stage of fetal development they are indicated, the normal ranges of the common obstetrical measurements and their implication to fetal well being
- identify first trimester pregnancies and their associated complications
- describe and identify the function, appearance, physiology, and associated complications of the normal and abnormal placenta, the umbilical cord and membranes, and amniotic fluid.
- identify and describe common fetal anomalies of the Central nervous system, abdomen and thorax, gastrointestinal system, genitourinary system, skeletal system and the cardiovascular system.
- identify and describe multiple gestations and their implications to fetal well being
- identify and discuss common gynecological pathology and abnormalities of the female pelvis

Objectives: The student will:

1. Explain maternal physiology as it occurs prior to fertilization.
   1. Explain the menstrual cycle and the resultant changes in the endometrium.
   2. Explain the hormonal cycle and the hypothalamic-pituitary-ovarian axis.
   3. Explain the ovarian cycle and the resultant changes in the ovary.
   4. Explain the relationship between the three maternal cycles.
   5. State the source and major effects of the hormones listed: FSH - follicle stimulating hormone, LH - lutenizing hormone, estrogen, progesterone, androgen, and Human Placental lactogen.
   6. Define the following terms related to maternal reproductive physiology: corpus luteum, graafian follicle, granulosa and theca cells, ovarian stroma, follicular phase/proliferative phase, luteal phase/secretive phase, germ cells, decidua, and estrogenic cycles.
embryological development of the fetus, the fetal membranes and placenta.

1. Describe the evolution of the primary follicle into a mature follicle
2. Explain ovulation.
3. Explain fertilization
4. List and describe the stages of cleavage.
5. List and describe the complications associated with implantation.
6. Describe the development of the decidua.
7. Define and describe the development of the fetal membranes.
8. Define the following terms related to formation of the embryo and membranes: zygote, fetus, decidua basalis, decidua capsularis, morula, blastocyst, amnion, chorion, yolk sac, extra embryonic coelum, villi, lacunae, trophoblast and crown-rump length.
9. List and define the functions of the placenta.
10. List the structures developed during the embryonic period and the week in which they develop.

3. Define and describe appropriate patient communication, patient preparation, obtaining patient history and clinical indications for the obstetrical/gynecologic ultrasound exam.
   1. Describe appropriate patient communication.
   2. Describe the appropriate patient preparation for an obstetrical/gynecologic ultrasound.
   3. List and define the classifications of pregnancy.
   4. List the indications for an obstetrical ultrasound.
   5. Describe and define pregnancy testing lab tests and values.

4. Identify normal pelvic anatomy on diagrams, photographs, models, and images taken with diagnostic x-rays, CT, MRI or ultrasound in three-dimensions, sagittal, coronal, transaxial and oblique planes.
   1. Identify, describe the location and sonographic appearance of the pelvic vasculature and musculature.
   2. Identify the structures in the pelvis and describe their normal anatomic relationship.
   3. Identify and describe the congenital anomalies associated with the uterus and pelvic organs.
   4. Identify and describe the histologic layers of the uterus and other pelvic organs.
   5. Identify and describe the potential spaces within the pelvis.
   6. Describe the sonographic appearance of the uterus.
   7. Describe the sonographic appearance of the ovary.
   8. Describe the size and appearance of the pelvic organs in various age groups.
   9. Specify the normal size of the uterus, ovaries and endometrium.
   10. Describe the postpartum appearance of the uterus and pelvis.

5. List and describe the various methods of fetal dating, stage of fetal development they are indicated, the normal ranges of the common obstetrical measurements and their implication to fetal well being.
   1. Demonstrate the proper use of an obstetric wheel to determine menstrual age.
   2. Describe the method of performing a gestational sac measurement in the first trimester and define its limitations and effectiveness.
   3. Describe the method of performing a crown-rump measurement in the first trimester and define its limitations and effectiveness.
   4. Describe the method of performing a biparietal diameter measurement and define its limitations and effectiveness.
   5. Describe the method of performing an occipital frontal diameter measurement and define its limitations and effectiveness.
   6. Describe the method of performing a head circumference measurement and define its
7. Describe the method of performing a cephalic index measurement and define its limitations and effectiveness.
8. Describe the method of performing an abdominal circumference measurement and define its limitations and effectiveness.
9. Describe the method of performing a head circumference/abdominal circumference ratio and define its limitations and effectiveness.
10. Describe the method of performing a femur length measurement and define its limitations and effectiveness.
11. Describe the method of performing fetal weight estimates and define its limitations and effectiveness.
12. List and describe other methods of fetal dating including femur length/abdominal circumference ratio, femur length/biparietal diameter ratio, femur length/head circumference ratio, binocular and ocular distances, total intrauterine volume, transcerebellar diameter, and epiphyseal appearance.
13. Explain the use of growth curves and their limitations and effectiveness.

6. Identify and describe appropriate scanning techniques, sonographic anatomy and pathology for first trimester pregnancies and their associated complications.
1. Identify and describe the appearance of the ovaries, uterus, cervix, vagina and the changes associated with a first trimester pregnancy.
2. Identify and describe the normal appearance of the fetal pole, yolk sac, chorion, amnion, uterus and ovaries during the first trimester.
3. Define and describe the sonographic appearance and findings associated with a blighted ovum.
4. Define and describe the sonographic appearance and findings associated with the four categories of spontaneous abortion.
5. Define and describe the sonographic appearance and findings associated with an ectopic pregnancy.
6. List the causes of first trimester bleeding.
7. Describe the following methods of pregnancy termination: dilation and curettage, saline injection, prostaglandin induction, hysterotomy and methotrexate or air injection.
8. Identify and describe the sonographic appearance of gestational trophoblastic disease and its sequella.

7. Describe and identify the function, appearance, physiology, and associated complications of the normal and abnormal placenta, the umbilical cord and membranes, and amniotic fluid.
1. List and define the following terms associated with fetal presentation and lie: vertex, cephalic, breech, longitudinal, transverse and oblique.
2. Describe the placental circulation including the hupogstric artery, spiral arteries, intervillous spaces, villi, cotyledon, basilar arteries, subchorial arteries, interlobular arteries and the marginal veins, rate of flow, function and efficiency.
3. Identify and describe the placental anatomy: lobes, lacuna, maternal surface, and fetal surface.
4. Describe the placental size and list the maternal complications associated with abnormal placental size.
5. Describe placental grading and factors associated with abnormal placental grade and their implications to fetal well being.
6. Discuss placental position, placental migration and the various degrees of placenta previa, their implications and the techniques used to identify placental position.
placental abruption, its sonographic appearances, symptoms, complications and risk factors, and various techniques utilized to improve visualization.

8. Discuss the various types of placental percreta and sonographic techniques used to diagnose percreta.

9. List and define other types of placental pathology: chorioangioma, teratoma, cysts, velamentous insertion, succenturiate lobes and infarcts.

10. Identify and describe the chorion, amnion, chorio-amniotic separation, amniotic band syndrome and synechia.

11. Describe and identify the anatomy of the normal and abnormal umbilical cord.

12. List and describe pathology associated with the single vessel umbilical cord and other fetal anomalies associated with single vessel cord.

13. List and describe other umbilical cord anomalies: allantoic duct cyst, omphalomesenteric duct, hemangioma, hematoma, mucoid degeneration, neoplasms, umbilical hernias, false knots and true knots.

14. Describe Doppler evaluation of the umbilical cord, the technique, normal vs. abnormal waveforms and their implication to fetal well being.

15. List and describe the function and purpose of the amniotic fluid, it’s content, defined normal amounts and associated fluid dynamics.

16. Define polyhydramnios and describe it’s etiology, appearance and the fetal anomalies associated with it.

17. Define oligohydramnios and describe it’s etiology, appearance and the fetal anomalies associated with it.

8. Identify and describe common fetal anomalies of the central nervous system, abdomen and thorax, gastrointestinal system, genitourinary system, skeletal system and the cardiovascular system.

1. Discuss the indications for sonographic evaluation of neural tube defects.

2. Define and discuss alpha-feto protein in relation to neural tube defects.

3. Identify and discuss the normal sonographic appearance of the cranium, brain, and spine in multiple anatomic planes.

4. Identify and describe the various central nervous system anomalies seen on ultrasound such as: anencephaly, acrania, encephalocele, iniencephaly, Dandy Walker Syndrome, Arnold Chiari II malformation, Vein of Galen aneurysm, agenesis of the corpus callosum, microcephaly, schizencephaly, holoprosencephaly, porencephaly, hydranencephaly, ventriculomegaly, spina bifida, myeloschisis, meningocoele, and meningomyelocele.

5. Discuss other signs and measurements used to diagnose central nervous system anomalies with ultrasound such as the banana sign, crescent sign, lemon sign, measurement of LV ratio, measurement of the ventricular atria, and measurement of the cisterna magna.

6. Discuss the normal appearance of the abdominal and thorax wall and contents.

7. Identify and describe the various abdominal and thoracic anomalies seen on ultrasound such as: ectopia cordis, cystic hygroma, thoracopagus, diaphragmatic hernia, pleural effusions, cystic adenomatoid malformation of the lung, and Pentatolgy of Cantrell.

8. Identify and describe the appearance of gastrointestinal anomalies seen on ultrasound such as: esophageal atresia, tracheo-esophageal fistula, duodenal atresia, omphalocele, Limb-Body Wall complex, gastroschisis and hyperechoic bowel.

9. Identify and discuss the normal genitourinary system as seen on ultrasound.

10. Identify and discuss the appearance of genitourinary anomalies seen on ultrasound such as: renal agenesis, Potter’s syndrome, Prune belly syndrome, UPJ obstruction, ectopic ureteroceles, Infantile Polycystic Kidney Disease, multicystic dysplastic kidney, posterior urethral valves, extrophy of the bladder, and testicular hydrocele.

7. Discuss...
normal sonographic appearance of the fetal skeleton on ultrasound.

12. Identify and describe the appearance of skeletal anomalies seen on ultrasound such as: osteochondrodysplasia, achondrogenesis, thanatophoric dysplasia, campomelic dysplasia, dystoses, phocomelia, osteogenesis imperfecta, and clubfoot.


14. Discuss the function of the following structures in fetal circulation: ductus venosus, foramen ovale, and the ductus arteriosus.

15. Identify and describe normal fetal cardiac views and anatomy as seen on ultrasound.

16. Identify and describe the anomalies of the fetal cardiovascular system seen on ultrasound such as: arrhythmias, atrial septal defect, ventricular septal defect, atrioventricular septal defect, univentricular heart, Epstein’s anomaly, hypoplastic left heart syndrome, Tetrology of Fallot, transposition of the great vessels, truncus arteriosus, coarctation of the aorta and cardiomyopathies.

17. Identify and discuss other fetal anomalies seen on ultrasound such as teratomas, tuberous sclerosis, constrictive dermopathy, and ovarian cysts.

18. Compare and contrast common chromosomal abnormalities such as trisomy 13, trisomy 18, trisomy 21, Turner’s syndrome and Klinefelter’s syndrome.

19. Identify and describe the signs and possible causes of fetal death in utero.

20. Discuss growth abnormalities including intrauterine growth retardation, its causes and classifications, the sonographer’s role, and macrosomia.

21. Discuss the implications of maternal conditions and disease on the well being of the fetus for the following: hyperemesis, infection, cardiovascular disease, pulmonary disease, thyroid disease, hemolytic disorders, diabetes mellitus, hypertension, eclampsia and pre eclampsia, Rh isoimmunization, coexisting masses and uterine rupture.

9. Identify and describe multiple gestations and their implications to fetal well being.
   1. List the indications for ultrasound, the incidence of, and the associated risks accompanying multiple gestations.
   2. Compare and contrast dizygotic and monozygotic twins.
   3. Describe the sonographic techniques utilized in evaluating multiple pregnancies.
   4. Describe and identify twin to twin transfusion syndrome and conjoined twins.

10. Identify and discuss common gynecological pathology and abnormalities of the female pelvis.
   1. Describe accepted protocols, indications for, and techniques utilized in evaluating the female pelvis with ultrasound.
   2. Identify and describe uterine abnormalities commonly seen with ultrasound such as: leiomyoma, endometriosis, adenomyosis, endometrial hyperplasia, endometrial polyps, hydrometra, pyometra, hematometra, endometrial carcinoma, cervical carcinoma, and leiomyosarcoma.
   3. Identify and describe ovarian abnormalities commonly seen with ultrasound such as: follicular cysts, corpus luteum cyst, paraovarian cyst, cystic teratoma, dermoid, fibroma, theca cell tumors, thecomas, ovarian torsion, polycystic ovaries, Stein-Leventhal syndrome, serous cystadenoma, mucinous cystadenoma, Brenner tumors, serous cystadenocarcinoma, mucinous cystadenocarcinoma, solid teratoma, dysgerminoma, Sertoli-Leydig Cell tumor, and Krukenberg tumor.
   4. Identify and describe inflammatory diseases of the pelvis such as: pelvic inflammatory disease, pyosalpinx, hydrosalpinx, chronic salpingitis, and tubal ovarian abscess.
   5. Identify and describe the sonographic appearance of intrauterine contraceptive devices such as Lippe’s loop, Copper 7, Copper T, Saf-T-Coil, Progestasert, and the Dalkon shield, and their prevalence and associated risks.

11. Discuss the
describe the sonographic appearance of extrapelvic pathology associated with obstetrics and gynecology such as: ascites, liver metastasis, hydronephrosis, pyelocaliectasis and maternal gallbladder disease.
Student Contributions and Class Policies:

Attendance is essential to your success and is required in compliance with the policies outlined in the Midland College Handbook. The student is expected to participate in class discussions. Reading and workbook assignments are also important and should be completed prior to lectures for each unit. Material from reading/workbook which is not covered in class may appear on tests. Missed exams/quizzes will be accepted with loss of one (1) letter grade per day that it is late. Alternate exams and/or format may be substituted. Late assignments will be accepted with loss of 25% per scheduled class day.

Evaluation of Students:

The final grade will be a criterion-referenced standard percentage, not curved, composed as follows: 2.5% attendance, 5% from lab evaluation, 5% from journal articles (2.5% each), 7.5% from computer aided instruction (2.5% for each), 20% from unit quizzes, 40% from unit exams, and 20% from the final examination.

1. There will be three unit exams consisting of approximately 50-100 questions. Each exam will be constructed from a random sample of the material presented prior to the exam date. Multiple formats may be used including short answer, short essay, diagram labeling and multiple choice.

2. The final exam will consist of 100-200 multiple choice questions and will be similar to the format utilized by the registry. The exam will be constructed of a random sample of all the material presented during the semester.

3. In the event that an exam is missed, it is the student’s responsibility to arrange for the make-up exam as soon as possible: a loss of one letter grade per day for any missed exam and an additional letter grade for each successive day thereafter will be assessed. The student may also expect an alternate method of testing for the make-up exam. If an exam is not made up, the student will receive a zero for that exam, and the grades will be averaged accordingly.

4. Class assignments may consist of online tasks including journal articles and worksheets. Lab assignments will consist of computer aided instruction and scan lab assignments. See attached for instructions.

5. Weekly unit quizzes will consist of 10-50 questions over the material covered in the previous week. Multiple quizzing formats will be utilized.

Course Schedule:

Class will meet every Tuesday from 1:00 pm. - 4:30 pm except for scheduled Midland College holidays. See attached class schedule for lecture topics to be covered, quiz and exam schedule. Lab for distance students will meet every Tuesday from 4:30 p.m. - 6:30 p.m. except for Midland College holidays.

SCANS Information:

The following SCANS skills will be taught and/or reinforced in this course:

**Foundation - Thinking Skills:** creative thinking; decision making; problem solving; seeing things in the mind’s eye; knowing how to learn; reasoning

**Workplace Competencies - Technology:**

selects technology; applies technologies to task; maintains and troubleshoots equipment
Instructor Information:

Name: Elizabeth Brown, MSRS, RDMS
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Name: Laurie Fitzgerald, RDMS, RN
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