DEN5210: Developmental Biology and Psychosocial Issues over the Lifespan

Fall 2021

Course Description:

Developmental biological and psychosocial foundation knowledge across the life span will be presented in this course. Focus will be placed on the basic biology of normal growth and development of the head, neck and oral tissue as well as the relevant biological and psychosocial issues associated with normal changes over the life-span that are relevant to oral health and the practice of dentistry. This course is a pre-requisite for DEN5221C, Oral Health Management and Psychosocial Issues Over the Lifespan in semester two.

I. General Information

Course Director: Christopher Connell
Office: 352-273-7643
Email:CConnell@dental.ufl.edu
Course Credits: 3
Semester: Fall

Contributing Faculty

Abimbola Adewumi (352) 273-7643 aadewumi@dental.ufl.edu
John P. Aris (352) 273-6868 johnaris@ufl.edu
Teemar Carey (352)273-7643 TCarey@dental.ufl.edu
Calogero Dolce (352) 273-7960 CDOLCE@dental.ufl.edu
Divakar Karanth Huttinagadde 352(273-5693) DKaranth@dental.ufl.edu
Edna Perez (352) 273-7643 EdnaPerez@dental.ufl.edu
Joseph Riley (352) 273-5966 JRILEY@dental.ufl.edu
Charles Widmer (352) 273-5696 WIDMER@dental.ufl.edu
Megan Lietzau (352) 265-2242 Lietzau@ufl.edu
Lisa Merlo Green (352) 294-4900 lmerlo@UFL.EDU
Gail Childs 352-273-5950 GCHILDS@dental.ufl.edu

Support Staff

Dawn R Perry (352) 273-7631 DPerry@dental.ufl.edu TA / Syllabus / Grade Administrator

II. Course Goals

The goal of this course is to introduce the biological foundations of growth and development of the head, neck, and oral tissue as well as developmental changes through adolescence. The influence of psychosocial factors and the behavioral sciences will be reviewed at major developmental stages of human life.

III. Course Overview

Course instruction will be accomplished through the following methods.

A. Lectures:

The lectures are designed to direct the student's reading and to emphasize material of primary importance. Generally, lectures provide
overall concepts and the student will need to consult their reference text, handouts and assignments for specific detail.

B. Behavioral Research Paper:

This paper is designed to apply interviewing skills and discovery learning to a behavioral issue in contemporary
pediatric dentistry. Paired students will report their findings in class.

C. A Case study in small groups

IV. Course Outline

Part I General Embryology

Basic concepts of growth and development
Principles of morphogenesis
Embryonic development weeks 1-4
Development of the nervous system, folding, heart development
Vasculature, Upper GI tract
Brain and cranial nerves and integument

Part II Craniofacial Embryology

Formation of the branchial arches, clefts, and pouches
Origins of craniofacial anomalies
Early stages of tooth development
Dentinogenesis, pulp formation and amelogenesis
Periodontium development
Root formation and tooth eruption
Development of the muscles of mastication
Development of the mandible/temporomandibular joint
Craniofacial Anomolies
Clinical Significance Dental Anomolies

Part III

A. Development: Birth to Age Three

Influences on future oral health: nutrition and prematurity
Systemic growth
Craniofacial growth
Development of the primary and permanent dentition
Eruption and occlusion of the primary dentition
Anomalies of tooth development
Determinants of human behavior
Stage theories of human development-milestones
Development of cognitive functioning
Emotional development
Growth of social awareness

B. Development: Age Three to Age Six

Systemic growth
Craniofacial growth
Development of the primary and permanent dentition
Oral habits
The dentist patient-parent triad
Principles of learning
Development of cognitive functioning
Emotional development
Growth of social awareness
Behavioral management
Development of fear

C. Pre-Adolescent Development: Age Six to Age Twelve

Systemic growth
Craniofacial growth
Eruption of the permanent dentition
Traumatic injuries to the dentition
Development of cognitive functioning
Emotional development
Growth of social awareness
Behavioral management
Informed consent
Child abuse

D. Adolescent Development

Drug abuse and eating disorders
Development of cognitive functioning
Emotional development
Growth of social awareness
Behavioral management
Informed consent
Behavior Risks

E: Clinical Relevance of Dental and Craniofacial Anomolies

Behavioral Science Topics (as assigned)
Culminating Case Study

V. Course Material

Required texts:

One of the following
Larsen's Human Embryology, Schoenwolf, 5th Ed, 2015, ISBN 9781455706846
The Developing Human Clinically Oriented Embryology, Moore, 10th Ed, 2016, ISBN 9780323313384

Optional text:

Langman's Medical Embryology, Sadler, 13th Ed., 2014, ISBN 9781451191646

Lecture Handouts:

Class handouts are posted on the document section of the DEN 5210 course in Canvas within two days of the
scheduled date of presentation. Printed copies of these materials will also be provided in class.

Additional Resource:

Dental Lib Guide: http://guides.uflib.ufl.edu/dental

VI. Course Objectives

Through lectures, course assignments, clinical examples and correlates the student will be able to:

Part I: General Embryology

1. Describe the basic concepts of growth and development and principals of morphogenesis.
2. Describe the repertoire of cellular activities. including; cell growth, cell division, cell death, the formation of mechanical attachments, generation of
force, differentiation by switching on or off specific genes, production of molecular signals to influence neighboring cells and response to signals that
neighboring cells deliver.
3. Describe the mechanisms of gamete formation, cell division, fertilization and zygote cleavage.
4. Describe differences between mitosis and meiosis.
5. Describe the formation and the blastocyst, the process and blastocyst implantation, the formation of the bilaminar embryo, the formation of the
embryonic cavities, the early processes in placentation, and gastrulation.
6. Describe the trilaminar embryo, neural tube formation, early somite formation, mesodermal development of the somites, and neural tube and
neural crest origins.
7. Describe embryonic folding, somite differentiation, and neural crest migration and neural tube closure.
8. Describe main features of heart development, the development of pericardium, the development of the aortic arches, and the development of the
arteries and veins.
9. Describe development anomalies responsible for patent ductus arteriosus, atrial septal defects, ventricular septal defects and tetralogy of Fallot.

10. Describe development of the respiratory system, and the anomalies: tracheo-esophageal fistula, esophageal atresia, and lobar emphysema.
11. Describe the formation of spinal cord, the formation of brain, the development of grey and white matter, and the major tissues to which neural crest
cells contribute.
12. Describe developmental basis of anomalies of nervous system, including hydrocephalus, spina bifida, anencephaly and encephalocele.

Part II: Craniofacial Embryology

1. List the main structures derived from pharyngeal arches, pouches and clefts.
2. Describe development of tongue, eye and ear.
3. Differentiate between normal and abnormal development of the face development.
4. Describe the origin and development of the dental lamina.
5. Describe the origin and development of the dental papilla and the dental follicle (dental sac).
6. Describe all stages of tooth development up to the bell stage.
7. Describe the components of the tooth in the bell stage.
8. Discuss the ultimate fate and function of the components of the bell stage tooth.
9. Define induction and discuss what cells/tissues or factors determine the initiation of tooth formation and the patterning of teeth.
10. Describe the development of the odontoblast and the formation of dentin.
11. Describe the formation of the ameloblast and the formation of an enamel rod.
12. Be able to draw a tooth in appositional stage and show the relationship of dentin, enamel and the cell layers involved.
13. Describe the developmental sequence of the periodontal tissues in the process of tooth development.
14. List the origin of each of the periodontal tissues and the clinical abnormalities that result from aberrant periodontal tissue formation.
15. Recognize the clinical implications of developmental abnormalities in periodontal tissue formation.
16. Describe root formation with emphasis on dentin and cementum.
17. Describe the current theories of tooth eruption.
18. Describe the process of tooth succession.
19. Describe causative factors of root resorption.
20. Describe the normal developmental process for the jaw muscles from myogenesis to whole muscle.
21. Describe the changes in myosin heavy chain composition from primary myotubes to adult muscle fibers.
22. Describe the regeneration of adult masticatory muscle fibers after injury and the rate of regeneration compared to limb muscles.
23. Describe the role of muscle regulatory factors during muscle development.
24. Describe the role of Meckel's cartilage and the remnant anatomical features in the adult.
25. Discuss the bony developmental process of the mandible and temporomandibular joint and compare it to long bone development.

26. Differentiate between the primary and secondary jaw joints during mammalian development.
27. Describe the development of the temporomandibular joint disc.
28. Describe oral health risk factors specific to pregnant woman stemming from both physiological changes and common dietary patterns.
29. Explain how nutrition in pregnancy impacts fetal oral structure development.
30. Explain dietary counseling and education techniques specific to assisting pregnant mothers and parents of infants to help in early
childhood caries prevention.

Part III:

A. Birth to Age Three

1. Describe the general physical development, craniofacial development and developmental milestones of the 0-3 year old child.
2. Describe the chronology of the primary dentition.

3. Describe the conditions that may cause anomalies of tooth number, size and morphology.
4. Identify the anomalies in enamel and dentin structure.
5. Describe Ericksons' Developmental Stage Theory and Piaget's Theory of Cognitive Development.
6. Describe the cognitive, emotional and social development of the 0-3 year old child.

B. Age Three to Age Six

1. Describe the general physical development, craniofacial development and developmental milestones of the 3-6 year old child.
2. Describe the chronology of the permanent dentition.
3. Describe common oral habits of the 3-6 year old child and growth changes that may be associated with these habits.
4. Discuss the acquisition and modification of behavior through classical conditioning, operant conditioning, and observational learning.
5. Describe the cognitive, emotional and social development of the 3-6 year old child.

C. Pre-adolescent Development - Age Six to Age Twelve

1. Describe the general physical development, craniofacial development and developmental milestones of the 6-12 year old child.
2. Describe the normal eruption pattern and common problems associated with the eruption of the permanent dentition.
3. Identify the etiology and clinical signs of dento-facial injuries in the child patient.
4. Describe the cognitive, emotional and social development of the 6-12 year old child.
5. Discuss issues related to informed consent with the 6-12 year old child.

D: Adolescent Development

1. Describe the general physical development, craniofacial development and developmental milestones of the 12-18 year old adolescence.
2. Describe the cognitive, emotional and social development of the adolescent.
3. Discuss issues related to informed consent with the 6-12 year old child.
4. Describe why a motivational approach may be more useful than a confrontational approach in addressing adolescent risk behavior.
5. Explain how importance and confidence affect patients' readiness to change their behavior.
6. List open-ended questions that could be used to begin discussions related to adolescent risk behaviors.

E: Clinical Relevance of Dental and Craniofacial Anomolies

1. Develop practical skills in clinical case conceptualization, problem and solving
2. Identify clinical applications in treating patients with dental and craniofacial anomolies.

VII. Course Competencies

This course teaches to the following competencies in the "Competencies for the New Dental Graduate".
1: Critical Thinking: Use critical thinking and problem-solving, including their use in the comprehensive care of patients, scientific inquiry and
research methodology.
7: Communication Skills: Apply the fundamental principles of behavioral sciences using patient-centered approaches for promoting, improving and
maintaining oral health.
9: Health Promotion & Disease Prevention: Provide oral health care within the scope of general dentistry to include health promotion and disease
prevention.
12: Patient Assessment, Diagnosis, Treatment Planning and Informed Consent: Provide oral health care within the scope of general dentistry to
include patient assessment, diagnosis, comprehensive treatment planning, prognosis, and informed consent.
13: Assess Patients with Special Needs: Assess the treatment needs of patients with special needs.

VIII. Evaluation

Evaluation includes
1) 3 written examinations
2) 1 Behavioral science paper
3) Participation in a Case-based learning assignment

Written examinations consist of multiple-choice and short essay questions, constructed with 4-6 questions from each one-hour lecture based on the
stated Learning Objectives.
Behavioral Research Paper evaluation: You can get up to 20 points for this assignment. The paper is worth 10 points. The presentation is worth 8
points and both the information and quality of the presentation count. In addition there are 2 points for the discussion that your team generates
following your paired discussion topic. For example if Team 1 is presenting - Team 5 is responsible to make sure the audience engages them in a
discussion. Team 5 will be awarded 0-2 points for the quality of the discussion - a lively discussion with Team 1 is worth 2 points.
The relative weights for each evaluation component are listed below in Assigning Grades. The examination dates are included in the course
schedule. Examinations include the assigned readings and material presented in class. Written examinations are not cumulative.

Weights:

Exam 1: - 30%
Exam 2: - 30%
Exam 3: - 25%
Behavioral Science Papers - 10%
Case-Based Learning - 5%

Remediation:

In the event that a student receives a final "E" grade for the course, her / his achievements and successes by subject will be
summarized by the course director, and she / he will be tested on the failed subjects, by the subject lecturer.

IX. Administrative Practices

Administrative practices for all UFCD courses are universally applied. Exceptions to or deviations from these practices are stated in the individual syllabi by the course director. When not individually stated in the syllabus, course administrative practices default to those identified under "Course Policies" on the DMD Student Website:

https://dental.ufl.edu/education/dmd-program/course-policies/

X. Grade Scale

DEN5210 Grade Scale

Method Letter Grade
Scale 100
Tolerance 0.5 (Final letter grades within this range will be rounded up.)
A 95 - 100
A- 92 - 95
B+ 88 - 92
B 84 - 88
B- 80 - 84
C+ 76 - 80
C 70 - 76
E 0 - 70