DEN6251: Science and Clinical Management of Dental Pain

Fall 2021

# Course Description:

This course provides understanding of orofacial dental pain and integrates knowledge concerning the nature, mechanisms, and pharmacological treatment of pain.

# I. General Information

## Course Director

Course Director: Yenisel Cruz-Almeida, MSPH, PhD

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Course Credits: 2

Semester: Fall

## Contributing Faculty

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## Support Staff

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# II. Course Goals

This course provides understanding of orofacial dental pain and integrates knowledge concerning the nature, mechanisms, and pharmacological treatments of pain. It is organized around four goals:

1. Learning the principles of characterizing, measuring, and assessing pain.

2. Learning the biological mechanisms of pain that help explain what is found by measurement and assessment.

3. Learning how pain is modulated by psychological, biological, and pharmacological interventions.

4. Learning how knowledge from the first three goals will be related to principles of oral pain management in acute and chronic pain treatment settings.

# III. Course Overview

This is a lecture-based course that also uses clinical case correlations to bridge the foundation knowledge in the basic science of pain mechanisms to the clinical science of

pain management. Upon completion of this course:

1. The student will have a good understanding of the phenomenon of pain and will be able to

define pain in a way that is understandable to dental colleagues and dental patients.

2. The student will be able to measure and assess orofacial pain and will care about doing so.

3. The student will be able to use a comprehensive strategy for identifying the physical sources

of pain and will realize that differential diagnosis and the scientific method utilize a similar

strategy.

4. The student will understand the basic anatomical and physiological principles that underlie

the ability to diagnose (related to 3 above) and treat pain conditions.

5. The student will understand the basic principles of acute and chronic pain management,

including the psychological, demographic, and cultural factors that influence treatment

decisions.

# IV. Course Outline

A. Characterizing, measuring, and assessing orofacial/dental pain and other types of pain.

1. Introduction to the dental pain course\*.

2. General principles of measurement and assessment of pain

a. Subjective reporting of pain

b. Behavioral and physiological responses

B. Neurophysiology

1. Receptor generating potential

2. Action potential conduction in myelinated and unmyelinated axons

3. Mechanisms of synaptic transmission

4. The functional significance of synaptic transmission.

C. Anatomy of innervation of orofacial region

1. Innervation of the teeth

2. Innervation of other orofacial structures

3. Anatomical connections to the central nervous system

4. Synaptic relays in the medullary dorsal horn

5. Ascending central pathways for pain

6. Somatotopic organization of central pathways

7. Connections with motor systems

8. Biological functions associated with pain

E. Primary nociceptive afferent mechanisms of normal pain and

inflammation.

1. Types of primary nociceptive afferent neurons and their mechanisms

2. Primary afferent mechanisms of inflammation

F. Case Presentations of Inflammatory Pain

G. Central neural mechanisms of pain with emphasis on trigeminal pain

1. Mechanisms of temporal summation, spatial radiation, and referred pain.

2. Central sensitization

3. Neural basis for primary and secondary hyperalgesia and allodynia

4. Pathophysiological pain

H. Principles of identifying physical sources of pain

1. Strategy of identifying physical sources of pain

2. Sensory testing

3. Tests of provocation and local anesthesia

I. Molecular neurobiology of pain

1. Neurotransmitter mechanisms of pain

2. Intracellular mechanisms of pain

J. General biological mechanisms of pain modulation

1. Spinal and trigeminal mechanisms of pain inhibition

2. Descending modulation of pain

3. Neurotransmitters that modulate pain

K. General principles of pain modulation (psychology)

1. Placebo and nocebo effects

2. Emotions and pain

L. Case Presentations of Neuropathic Pain

M. Review of lectures and case presentation sessions. All faculty named

above.

N. Identifying Sources of Endodontic Pain

O. Neuropharmacology of pain modulation

1. Non steroidal anti-inflammatory agents (mechanisms and applications)

2. Opioid analgesics (mechanisms and applications)

3. Other types of analgesics (mechanisms and applications)

P. Acute pain management

1. Interfacing diagnosis with management

2. Psychological management of orofacial pain

3. Psychosocial issues in pain management

Q. Chronic pain management

1. Characterizing different types of persistent pain

2. Matching care requirements to pain conditions

R. Demographic and cultural factors in pain management

S. Review of lectures and case presentations.

# V. Course Material

Course material will be available in Canvas.

## Additional Resource:

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

# VI. Course Objectives

The following objectives refer to learning to understand and explain the listed topics. Some objectives additionally include the ability to assess pain and apply new knowledge to specific clinical cases.

Following completion of this course, the student will:

1. Define pain

2. Categorize the dimensions of pain and their interactions

3. Describe the general sensory features of pain

4. Differentiate the unique characteristics of pain: radiation, referral, spatial and temporal summation

5. Obtain and interpret subjective reports of pain and interpret them

6. Assess behavioral and physiological responses to pain

7. Identify the strategy of identifying physical sources of pain

8. Describe how sensory testing helps to identify physical sources of pain

9. Compare how tests of provocation/local anesthesia help identify physical sources of pain

10. Cite the basis of the receptor generating potential

11. Recall the mechanisms of action potential conduction in myelinated and unmyelinated axons

12. Describe the mechanisms of synaptic transmission

13. Illustrate the functional significance of synaptic transmission.

14. Compare the innervation of the teeth

15. Explain the innervation of other orofacial structures

16. Discuss the anatomical connections of primary trigeminal afferents to the central nervous system

17. Describe the synaptic relays in the medullary dorsal horn

18. Illustrate the ascending central pathways for pain

19. Explain the somatotopic organization of central pathways

20. Recognize the primary afferent and dorsal horn mechanisms of normal pain

21. Contrast general mechanisms of pain from inflammation

22. Describe the general mechanisms of pathophysiological pain

23. Explain the general mechanisms of spinal and trigeminal mechanisms of pain inhibition

24. Relate the general neurotransmitter mechanisms of pain

25. Identify the molecular intracellular mechanisms of pain

26. Contrast the placebo and nocebo effects

27. Analyze the effects of emotions on pain

28. Describe how pain can be modified by psychological factors

29. Explain the basic mechanisms of descending modulation

30. Cite the neurotransmitters that modulate pain

31. Describe the mechanism and application of non steroidal anti-inflammatory agents

32. Describe the mechanism and application of opioid analgesics.

33. Describe the mechanism and application of other types of analgesics.

34. Apply Interfacing diagnosis with management

35. Demonstrate psychological management of orofacial pain

36. Explain psychosocial issues in pain management

37. Characterizing different types of persistent pain

38. Match care requirements to pain conditions

39. Assess influence of gender on pain

40. Compare pain and cultural/ethnic background

41. Integrate basic science and clinical knowledge of orofacial pain

# VII. Course Competencies

This course teaches the following competencies in the "Competencies for the New Dental Graduate".

Domain I: Critical Thinking

1: Critical Thinking: Use critical thinking and problem-solving, including their use in the comprehensive care of patients, scientific inquiry and

research methodology.

3: Apply biomedical science knowledge in the delivery of patient care.

Domain VI: Patient Care - A. Assessment, Diagnosis, and Treatment

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.

Domain VI: Patient Care - B. Establishment and Maintenance of Oral Health

15: Patient Management: Provide oral health care within the scope of general dentistry to patients in all stages of life.

21: Provide oral health care within the scope of general dentistry to include local anesthesia and pain and anxiety control, including consideration of

the impact of prescribing practices and substance use disorder.

# VIII. Evaluation

The process for evaluating the student's performance in this course will consist of a midterm, a final exam, weekly activities and four quizzes. The exams and quizzes can be made up of multiple choice, short answer, matching, true or false, or essay type questions. The number of questions on any given topic will be determined by the faculty that presented the material. The number of test questions per topic may or may not correlate with the number of lecture hours spent on the topic. The exams may cover material presented in the traditional lecture format as well as material presented via the weekly activities or discussion sessions.

They will also cover material in the assigned readings. The grade from the course will be determined from the midterm, final exam, weekly activities and the four quizzes:

* Midterm exam will count 30%
* Final exam will count 30%
* 4 quizzes will count 20%
* Weekly activities will count 20%

An average of 65% or greater on the exams must be achieved to pass the course. A combined score of less than 65% will result in a grade of E for the course.

## Course Remediation:

The student must then remediate the E grade by scheduling a comprehensive remediation exam with the course director.

Successfully passing the remediation exam (score >= 65%) will result in a final course grade of D.

## Make Up Exams and Quizzes:

If possible students should arrange for an alternative testing time with the course director prior to an exam or quiz if they have a conflict with the scheduled evaluation. The course director reserves the right to provide an evaluation that differs from the scheduled evaluation.

## Exam, Quiz or CBL Value

Exam 1 30

Quiz 1 5

Quiz 2 5

Quiz 3 5

Quiz 4 5

Final Exam 30

Weekly Activities 20

Total Points 100 Possible

## Faculty Evaluations

“Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://ufl.bluera.com/ufl/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.”

# 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

DEN6251 Grade Scale

Method Letter Grade

Scale 100

Tolerance 0.5 (Final letter grades within this range will be rounded up.)

A 95 - 100

A- 90 - 95

B+ 85 - 90

B 80 - 85

B- 75 - 80

C+ 70 - 75

C 65 - 70

E 0 - 65