

01/06/2022

\*MSAT 350: Applied Biomechanics and Arthrokinematics

Dr. Darrin Smith

\*Concordia University Mission

Concordia University is a Lutheran higher education community committed to helping students develop in mind, body, and spirit for service to Christ in the Church and in the world.

\*Program/Department Mission

Health and Human Performance Purpose Statement

The goal of the Health and Human Performance Department is to foster the student's growth in mind, body, and spirit for service to Christ in the Church and in the world. In addition, the Department strives to help all Concordia students obtain the knowledge, skills, and attitudes necessary for them to lead healthy, active, and productive lives. Finally, Health and Human Performance graduates will possess the specialized knowledge in their chosen profession to be highly competent and contributing members of the working world. They will be well prepared to serve the health and human performance needs of a myriad of populations.

Master of Science in Athletic Training Program Mission Statement

The CAATE accredited Concordia University Wisconsin Master of Science in Athletic Training Program will provide students with the professional preparation necessary to succeed as an entry-level athletic trainer. The program will provide students an educational experience encompassing communication, problem solving, clinical skills, and service. As a result, students graduating from the program will possess the knowledge, skills, and abilities of a successful clinician, will be prepared to pass the Board of Certification Examination, and will be eligible for appropriate state credentialing. The Concordia University Wisconsin Master of Science in Athletic Training Program will accomplish its mission through a holistic approach to the development of the mind, body, and spirit.

\*Course Number and Name: **MSAT 350: Applied Biomechanics and Arthrokinematics**

\*Course Description: This course is designed to teach and clinically apply mechanical principles that relate to the structure and function of living organisms. Application of human movement as it relates to kinematics, kinetics, functional assessment, motion analysis, structural biomechanics, and properties of human tissues will be examined.

\*Credit Hours: 3 credits

Instructor(s): Darrin M Smith Ph.D., ATC, PES  
H002C  
(262) 243-4371  
[darrin.smith@cuw.edu](mailto:darrin.smith@cuw.edu)  
Office Hours: TBD

Course Location: TBD

Course Meeting Days and Times: TBD

Instructor-student interaction and student preparation time: Each regular face-to-face class session is 50 minutes in length. The class will regularly meet 45 times, with an additional 2-hour final exam period. Therefore, total number of face-to-face instructor-student contact/interaction hours for the course will be 40 hours. The students enrolled in this course are expected to complete 6 hours of preparation each week, for the 16-week semester. Therefore, the total number of student study/preparation hours will be

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96 hours. The combined total number of instructor-student contact and student preparation hours will be 136 hours.

Course Prerequisites: BIO 191

Required Resources:

Coach's Eye App (Version 5.3.4 or higher) The Precision Pack (includes the angle, timer, and spotlight tools). **THIS IS NOT THE FREE VERSION APP.**

Additional Learning Resources:

1. Laptop, Tablet, or Smartphone/iPhone
2. Socrative Student (Website access: <http://b.socrative.com/login/student/> ) Room #: 899172c6
3. AMA Formatting Resources:  
[www.docstyles.com/library/amastat.pdf](http://www.docstyles.com/library/amastat.pdf)  
[www.library.tamu.edu/help/help-yourself/citing-sources/files/Using-the-AMA-Style.pdf](http://www.library.tamu.edu/help/help-yourself/citing-sources/files/Using-the-AMA-Style.pdf)
4. Centre for Evidence-Based Medicine – [www.cebm.net](http://www.cebm.net)
5. Physiotherapy Evidence Database (PEDro) – [www.pedro.org.au](http://www.pedro.org.au)
6. PubMed Clinical Queries – [www.ncbi.nlm.nih.gov/pubmed/clinical](http://www.ncbi.nlm.nih.gov/pubmed/clinical)
7. Gray Institute of Applied Functional Science – [www.grayinstitute.com](http://www.grayinstitute.com)
8. Medical Term Pronunciation Program - <http://www.howjsay.com>

Suggested Apps:

1. Visible Body (Version 1.0.0 or higher)
2. Essential Skeleton 4 (This is a free app! Try it out!)

Teaching Strategies: This course will utilize: online lectures/presentations, in class critical thinking exercises, group discussions, collaborative quizzes, written documentation practices, applied principles of evidenced-based practice, live patient interaction, and various forms of immediate student feedback.

Course Evaluation and Grading:

Midterm Examination	25 points
Final Examination	25 points
Quizzes (5 @ 10 pts each)	50 points
Laboratory Activities (5 @ 10 pts each)	<u>50 points</u>
Total	150 points

1. Written Examinations (Targeted SLOs 1, 2, 4)

Two written examinations (midterm and final) will be given over the course of the semester consisting of lecture, quiz, assigned reading, and laboratory activities. Exam questions will be designed to address

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material knowledge, comprehension, application, analysis, synthesis, and evaluation of all class concepts.

**2. Quizzes** (Targeted SLOs 1, 2, 4)

There will be approximately 5 quizzes given (online or in class) used to calculate the quiz grade. Quiz questions will be designed to address material knowledge, comprehension, application, analysis, synthesis, and evaluation of all class concepts.

**3. Motion Capture Analysis Laboratory Activities** (Targeted SLOs 1, 2, 4)

Laboratories will be assigned for corresponding lecture sections for various areas of the body. These will address recall, critical thinking and problem solving application. Using the Coach's Eye App, students will practice and develop assessment and evaluation skills that examine selected movement patterns of human function. Assessment components include: movement drivers, internal forces, external forces, arthrokinematics, physiological movement, and activity specific muscle activation. Instructions and rubrics will be posted online via Blackboard throughout the course of the semester.

Learners will be asked to construct several comprehensive biomechanical analyses of common sport/rehabilitation exercises/activity on themselves. Students will identify, analyze and discuss the following over several constructed screencasts:

- The basic purpose of the movement along with underlying mechanical objectives
- The primary movement phases of the task
- The simultaneous versus sequential nature of the movement
- The mechanical principles that are relevant to the movement and those physical forces which oppose or assist the movement
- The arthro/ osteokinematics associated with each movement phase for selected articulations of the kinetic chain
- Possible injury considerations that could result from range of motion or motor control dysfunction

**It's required that Coaches Eye Movement Analysis Software be utilized for all laboratory activities.**

All point totals (including: number of tests, quizzes, or additional assignments) are subject to change based on class covered content. The instructor reserves the right to change/waive course requirements based on the amount of content presented and or taught in class. Audio or video recording of any class sessions is prohibited unless the instructor has granted permission (in writing) to the student. The instructor reserves the right to make changes to this syllabus as they see appropriate for successful completion of this course.

**Grading scale:**

93 - 100% = A	83 - 86% = B	73 - 76% = C	63 - 66% = D
90 - 92% = A-	80 - 82% = B-	70 - 72% = C-	60 - 62% = D-
87 - 89% = B+	77 - 79% = C+	67 - 69% = D+	59 - below = F

**Course and Instructor Policies:**

Note that this syllabus is a general plan for the course and deviations announced to the class, by the professor, may be necessary.

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**Attendance Policy:** Students are required to attend each class in order to receive full credit for the course. In the event that a student must miss a class, prior notice must be given to the instructor at least ONE WEEK in advance. In the case of emergencies, notice must be given to the instructor prior to the start of class. Excused absences for class will not be counted against the student, but the student must make an effort to make up work missed. If the student does not contact the instructor to make up missed work within ONE WEEK, a grade of "0" will be recorded in the gradebook.

**Cell Phone Policy:** The use by students of cell phones, PDAs, or similar communication devices during scheduled class time is prohibited. All such devices must be turned off or put in a silent (vibrate) mode and ordinarily should not be taken out during class. Given the fact that these same communication devices are an integral part of the University's emergency notification system, an exception to this policy would occur when numerous devices activate simultaneously. When this occurs, students may consult their devices to determine if a university emergency exists. If that is not the case, the devices should be immediately returned to silent mode and put away. Other exceptions to this policy may be granted at the discretion of the instructor.

**Examination/Assessment Policy:** Students are required to complete each examination and assessment in order to receive full credit for the course. In the event that a student must miss an examination or assessment, prior notice must be given to the instructor at least ONE WEEK in advance. The alternative examination or assessment will then be scheduled prior to the original date, when possible. In the case of emergencies, notice must be given to the instructor prior to the start of class and written documentation of the emergency must be provided to the professor. If the student does not contact the instructor with the appropriate documentation and a request for an alternative examination or assessment within ONE WEEK, NO make-up examination or assessment will be given. The style and content for any alternative examination or assessment is at the professor's discretion. Any exceptions to any of the above will result in a zero (0) grade for the examination or assessment.

**Late Assignment Policy:** Each assignment is due on the date specified on the class schedule and/or as announced in class. NO late assignments will be accepted. If a student will be missing class due to travel/illness/etc., he/she has ONE week to contact the instructor to make up any missed assignments.

**Dress Code for Laboratory Activities:** All students are expected to wear appropriate clothing for laboratory activities. The instructor will announce (in class or via email) 48 hours in advance when a class lab activity will be taking place. These labs may require being dressed in shorts and a t-shirt to allow for accurate performance of various forms of assessment/treatment. Students are expected to conduct themselves in a professional manner during all classroom activities.

\*Program/Department Policies: Please refer to the Master of Science in Athletic Training Program Handbook for all MSAT program policies and procedures.

\*Concordia University Policies:

\*Accessibility Services: In accordance with the Americans with Disabilities Act (ADA) and the Americans with Disabilities Amendments Act (**ADAAA**) and Section 504 of the Vocational Rehabilitation Act of 1973, individuals with disabilities are protected from discrimination and assured accessibility services and accommodations that provide equal access to the activities and programs of the University. Students with a disability who require accessible accommodations in order to obtain equal access to this course should contact the Director of the Academic Resource Center (ARC) & Accessibility Services:

- Mequon campus, Centers and Online (262) 243-4299 or [www.cuw.edu/arc](http://www.cuw.edu/arc)
- Ann Arbor campus (734) 995-7582 or [www.cuaa.edu/arc](http://www.cuaa.edu/arc)

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\*Recording policy: Students may record class sessions when recording is part of an accommodation specified by the Academic Resource Center (ARC) & Accessibility Services. In all other circumstances, students must obtain the written permission of the course instructor prior to recording a class.

\*Academic Integrity Policy: Concordia University expects all students to display honest, ethical behavior at all times and under all circumstances. Academic dishonesty is defined as follows:

**Cheating:** includes, but is not limited to: a) the use of unauthorized assistance in taking any type of test or completing any type of classroom assignment; b) assisting another student in cheating on a test or class assignment, including impersonation of another student.

**Plagiarism:** includes, but is not limited to: a) failure to give full and clear acknowledgement of the source of any idea that is not your own; b) handing in the same assignment for two different courses without the consent of the instructors.

**Fabrication:** the forgery, alteration, or misuse of any University academic document, record, or instrument of identification.

**Academic Misconduct:** intentionally or recklessly interfering with teaching, research, and/or other academic functions.

**Sanctions:** Faculty members who find evidence of academic dishonesty have sole discretion to determine the penalty, using their professional judgment. This can include a failing grade in the course, or removal of the student from the course. Additional sanctions will be imposed when a student is found to have violated the academic integrity policy more than once; these sanctions may include suspension or expulsion from the university.

\*Test integrity software: Some academic courses and programs use test integrity software. Respondus LockDown Browser and/or Respondus Monitor may be required for exams taken through the learning management system. Students may be required to complete an identity authentication procedure and be recorded using audio and video during the exam session. Students cannot print, make screen captures, access other web pages, or access other applications while taking the exam. If test integrity software will be used in this course, the instructor will provide additional information.

[Respondus LockDown Browser information for students](#)

[Respondus Monitor information for students](#)

\*Concordia University Required Student Technology: Please see the following link for required technology resources. Your individual program may have different requirements. [Link to computer requirements for Mequon students](#). or [Link to computer requirements for Ann Arbor students](#).

\*Title IX Policy: Concordia University is committed to fostering a safe, productive learning environment. University policy and federal law (Title IX) prohibit discrimination on the basis of sex which includes but is not limited to harassment, domestic and dating violence, sexual assault, and stalking. Sexual misconduct of any type is not permitted by the university. Please see the following link for more information about CU's policies and procedures concerning sexual misconduct: [Title IX Policy](#)

\*Relationship to the Curriculum: This course will expand on knowledge the students possess from the previous year's courses (BIO 191 and BIO 192). It is designed to promote self-exploration of the

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independent learning process. Attention will focus on the clinical application of biomechanical anatomy as it relates to function, assessment, and rehabilitation of the injured patient.

\*Connection to Concordia University Global Learning Outcomes (GLOs): This course is designed to connect to the following Concordia University Global Learning Outcomes:

3. Integrated Disciplinary Knowledge: For this GLO, students will understand the importance of a patient-centered approach to health care, involving all disciplines.
5. Communicative Fluency: For this GLO, students will communicate with others in an oral and written professional format.

\*Program/Department Student Learning Outcomes: This course will address the following Athletic Training Program Student Learning Outcomes:

1. Students will communicate effectively with others in an oral or written professional format.
  - 1.1 Students will communicate professionally, to a variety of audiences, utilizing various media modes.
  - 1.2 Students will write clearly and professionally, using appropriate medical vernacular.
2. Students will demonstrate effective critical thinking and problem solving.
  - 2.2 Students will apply an evidence-based model to make informed decisions about patient care.

Course Objectives: As a result of this class, the student will:

1. Identify, recall and demonstrate principles and concepts of body movement, including normal osteokinematics and arthrokinematics
2. Design and appraise functional assessment as it relates to injured and non-injured populations
3. Examine and inspect posture and fundamental movement patterns in accordance to soft and bony tissue stress
4. Assess the quantity and quality of osteokinematic joint motion as part of functional movement pattern
5. Recognize and identify normal/dysfunctional joint play (arthrokinematics)
6. Explain the relationship between posture, biomechanics, and ergonomics and the need to address these components for a therapeutic and/or preventative intervention
7. Identify areas of dysfunction and develop corrective strategies utilizing evidenced-based principles to address individual deficiencies.

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Class Schedule: *The following schedule is tentative and changes may be necessary.*

<b>DATE</b>	<b>TOPIC</b>	<b>READING</b>	<b>SLOs</b>
8/27	Principles of Human Motion	MSAT 350 Welcome Letter	1, 2, 4
8/29	Coaches Eye App Training	Coach's Eye Online Tutorials	
8/31		Introduction to B & A Handout	
9/3	Labor Day – No Class (9/4)	Basics of Biomechanical Analysis Handout	1, 2, 4
9/5	Basics of Biomechanical Analysis	The Musculoskeletal System Handout	
9/7			
9/10	Basics of Biomechanical Analysis	Basics of Biomechanical Analysis Handout	1, 2, 4
9/12		The Musculoskeletal System Handout	
9/14	The Kinetic Chain		
9/17	The Kinetic Chain	View the Kinetic Chain PPT	1, 2, 4
9/19	The Foot, Ankle, & LL	F/A/LL Handout	
9/21			
9/24	The Foot, Ankle, & LL	Knee Complex Handout	1, 2, 4
9/26	The Knee Complex		
9/28			
10/1	The Knee Complex	Hip & Pelvis Handout	1, 2, 4
10/3	The Hip, Pelvis, and Sacrum		
10/5			
10/8	The Hip, Pelvis, and Sacrum	Review and prepare to be tested on all material from week 1-6 (excluding the hip/pelvis/sacrum material)	1, 2, 4
10/10	Written Midterm Exam		
10/12			
10/15	The L- Spine	Spine Handout	1, 2, 4
10/17	No Class		
10/18 & 10/19	Fall Break		

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10/22 10/24 10/26	The T-Spine The C-spine		1, 2, 4
10/29 10/31 11/2	The Spine (Holistic) The Shoulder Complex	Shoulder Complex Handout	1, 2, 4
11/5 11/7 11/9	The Shoulder Complex		1, 2, 4
11/12 11/14 11/16	The Elbow and Forearm	Elbow and Forearm Handout	1, 2, 4
11/19 11/21 11/23	The Forearm and Wrist No Class 11/23 Thanksgiving Break		1, 2, 4
11/26 11/28 11/30	The Wrist and Hand	Wrist and Hand Handout	1, 2, 4
12/3 12/5 12/7	The Wrist and Hand		1, 2, 4
12/10	Finals Week You made it !!! ☺	Final Exam TBD	1, 2, 4