MICHIGAN STATE UNIVERSITY
Dept. of Kinesiology/Institute for the Study of Youth Sports

KIN 856: Physical Bases for Coaching – Practical application of the sport sciences to improve athlete performance

Summer Term - 2010

Online Course Syllabus

Instructor Information

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Course Description

This on-line course provides coaches, athletic administrators, and directors of recreational programs with information about the physical principles of training and athletic performance – information these groups need to know to exact the greatest results and optimize performance in the athletes they work with. The course will focus on the fundamentals of musculoskeletal anatomy and physiology, the biomechanics of movement, principles of training and program design, strength and conditioning, sports medicine and injury prevention, as well as nutrition, physiology and principles of training. In addition this course will look at how these seemingly distinct areas of sport science and medicine are all inter-related and 'work together' to impact athlete performance and well being. The course will use a text book as the primary resource. However, the book will be supplemented with as much, if not more, information in the form of outside readings, journal articles, web site reviews and real life examples of how sport science impacts athletes. The student taking this course will come away with an understanding the physical sciences and how a coach can apply this knowledge to develop healthier and better athletes. A key part of the course will be the development of coaching tools – resources and informational pieces that can be integrated directly into a youth athletic program.

Course Objectives

Upon completion of the course, students will be able to:

- Demonstrate knowledge of the physical sciences and how they impact sport performance and athlete development;
- Understand your role as a coach in integrating the sport sciences into your everyday training as well as your seasonal planning;
- Take the scientific 'book knowledge' and translate it into tools that can be put to use immediately in an 'everyday coaching environment';
- Develop an understanding of the resources available to coaches and where to turn when you have questions related to the physical sciences and sport performance;
- Understand the importance of integrating other professionals into your training program and developing a professional network for your team and/ or the athletes you work with.

Texts and Resources

Main Text: Conditioning for Strength and Human Performance
T. Jeff Chandler and Lee E Brown
Lippincott Williams & Wilkins
ISBN-13: 978-0-7817-4594-9
ISBN-10: 0-7817-4594-2

Supplemental Resources

Supplemental readings and resources will be provided throughout the semester to augment the information in the main text. These will take the form of articles, internet resources, videos, and/or other media formats. It is difficult to find a 'text book' that provides good scientific content and also shows how that information should be applied in 'real life.' The supplemental readings and resources will help in this and show you ways to apply this information with the athletes you work with.

All supplemental material (articles, videos, URLs) will be made available on the ANGEL system.

Course Grading Scale

The course will be graded consistently with other courses offered in the Institute for the Study of Youth Sport (ISYS) and the grading convention is provided below. Grades will be determined on your performance on regular quizzes, assignments, and projects offered throughout the year. Points will be awarded for each assignment and your final grade will be determined based on the percentage of the total available points you earned throughout the course.

There will be **no** formal tests. However, the projects and assignments will be structured in such a way that it is clear whether or not you have a working knowledge of the material.

You will get out of this course what you put into it. The goal, as mentioned before is to provide you will tools for your coaching toolbox. Upon completion of the course we will have developed a number of resources that can directly impact your program and/or the athletes you work with.

The effectiveness of these tools will in large part be determined by your understanding of the material and willingness to put the time in to make a quality 'product'.

Grade		Percent Material Correct
A	(4.0)	>90%
B+	(3.5)	85-89%
B	(3.0)	80-84%
C+	(2.5)	75-79%
C	(2.0)	70-74%
D+	(1.5)	65-69%
D	(1.0)	60-64%
F	(0.0)	<59%

Course Content

The course will cover a wide range of topics, with a focus on the application of sport science on the field of play. The general areas that will be covered are overviewed below and the week-by-week schedule is presented in the accompanying Course Schedule. Note that for each of these topics entire courses have been developed. We will attempt to focus our efforts on the main pieces of information that impact you as coaches and athletic administrators. We will also try to follow a logical progression in many areas: for example – after an introduction to the course we will discuss musculoskeletal anatomy and muscle function, as this serves as the foundation for understanding biomechanics, which in turn will precede our discussions of sports medicine/ athletic injuries and strength and conditioning.

Musculoskeletal anatomy and muscle function – Instead of looking at all of the body's systems, we will focus our efforts primarily on understanding muscular and skeletal anatomy – identifying the bones in the skeleton along with the major muscle groups and how they function. We will also spend some time talking about joints, their movement, the physical planes of movement, and movement terminology as this will serve as the foundation for our future discussions of biomechanics. While this may seem beyond the 'scope' of what a coach should know, those who have a foundation in anatomy are better prepared to critically analyze movement and technique, design training programs (strength & conditioning as well as 'on-field' training), and understand injuries and injury mechanisms. In the course of this section we will look more closely at muscle and the characteristics that make it one of the most interesting tissues in the human body and one that has a profound impact on human athletic performance.

Exercise Physiology – Exercise physiology is the study of the body's systems and how they perform, and adapt, in response to exercise. There are a wide range of topics that will be covered in this unit ranging from discussing the different energy systems that fuel athletic performance, to and understanding of the cardio-pulmonary system, to overtraining and recovery. We will also look at topics like jet lag and altitude training –topics that relate particularly to some of the challenges faced by athletes attempting to achieve optimal performances. Upon completion of this unit, you will have a better understanding of how the body responds to physical and physiologic stresses and how you can use this information to design effective training programs that allow for intense training along with proper recovery.

Biomechanics – Biomechanics is the study of forces and how they impact the body. Forces create movement and movements become technique. In this unit we will talk about many of the fundamental concepts in biomechanics – Newton's laws, velocity, acceleration, levers, power, momentum, stability and balance to provide a few examples. We will also look specifically at technique analysis in several sports and introduce you to some of the coaching tools available to analyze performance. This is an area that has the potential to be very math-intensive. However, we will limit the math and actual problem solving to focus on those things you will use regularly as part of your coaching.

Sports Nutrition – Food fuels the body; what an athlete puts into his/her body not only has a profound effect on how well they will perform in training and competition but also impacts his/her health and well-being. In this unit, we will cover the basics of nutrition while also digging a little deeper to understand how to fuel the body for performance and recovery. We will also looking at the topic of supplements – discussing what they do, which ones are 'legal', and which ones actually have been shown to enhance athlete performance.

Strength and Conditioning – Many times coaches are required to wear many hats – one of which is strength coach. Strength and conditioning is an essential component of almost every athletic training program and can be done with athletes of any age, provided it is done safely and with athlete growth and development in mind. In this unit we will look at the different training modalities, from strength training equipment to plyometrics, and determine what exercises are right for the athletes you work with. We will also look at how these exercises should be structured to address the demands of the sport and complement the sport-specific training the athletes are engaged in. This unit will include a discussion of fundamental components of training and we will discuss such topics as stretching/ flexibility and warm-up/ cool down.

Sports Medicine and Injury Prevention – Injuries are often thought of as an unavoidable part of any athletic program. However, many injuries can be prevented by using proper technique and engaging in a strength and conditioning program that includes an injury prevention component. If the injury cannot be avoided, damage (and lost training time) can often be minimized by taking the proper steps and having the injury evaluated by the proper person. In this unit we will look at common injuries and injury mechanisms in sport, and also how these injuries should be handled. We'll also introduce you to the 'sports medicine team' and go through an exercise in which you identify a local network of professionals that can assist you should an athlete you work with ever become injured.

Putting it all Together – You may be asking yourself, "How do we put all of this information together and put it into action with the athletes we work with?" That is where planning and understanding some training fundamentals come into play – a topic more commonly referred to as periodization and program design. At the end of this unit you will be able to develop your 'plans' – your long-term, multi-year plan, your seasonal plan, and your day-to-day plan that will positively impact performance of the athletes you work with.

Growth and Development – Children are not simply little adults and the way young athletes train and compete should be structured differently from what is prescribed for an adult. In this unit we will look at various aspects of growth and development and discuss how an

understanding of the developmental process will help to you design a better training environment for the young athletes you work with, while also taking a long-term perspective on athletic participation. Our study in this area will, in all likelihood, not be a stand alone section. Rather age appropriate information will be integrated throughout the other units. We will attempt to focus on identifying 'challenges' faced by younger athletes and developing an age-appropriate roadmap for working with athletes of different ages.

Tentative Course Schedule

Week Number	Dates	Topic and Tools
1	(5.17 to 5.23)	Overview/ Introduction
2	(5.24 to 5.30)	Musculoskeletal Anatomy
3	(5.31 to 6.6)	Muscle Function
4	(6.7 to 6.13)	Exercise Physiology – Energy Systems
5	(6.14 to 6.20)	Exercise Physiology
6	(6.21 to 6.27)	Biomechanics - Fundamentals
7	(6.28 to 7.4)	Biomechanics – The Physics of Sport
8	(7.5 to 7.11)	Sports Nutrition
9	(7.12 to 7.18)	Sports Nutrition - Supplements
10	(7.19 to 7.25)	Strength and Conditioning
11	(7.26 to 8.1)	Strength and Conditioning
12	(8.2 to 8.8)	Sports Medicine and Injury Prevention
13	(8.9 to 8.15)	Periodization and Training Design
14	(8.16 to 8.19)	Catch-up week

Academic and Professional Integrity

Expectations related to academic integrity are published in the *Guidelines for Integrity in Research and Creative Activities* (http://grad.msu.edu/integrity.htm). Topics include: (a) honesty in proposing, performing, and reporting research; (b) recognition of prior work; (c) confidentiality in peer review; (d) disclosure of potential conflicts of interest; (e) compliance with institutional and sponsor requirements; (f) protection of human subjects and humane care of animals in the conduct of research; (g) collegiality in scholarly interactions and sharing of resources; and (h) adherence to fair and open relationships between senior scholars and their coworkers. KIN 856 students are expected to understand and abide by these policies and guidelines.

KEY Quote from MSU Research Integrity, Vol. 9, 2. 2005-2006.

"Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing or reviewing research, or in reporting research results.

- *Fabrication is making up data or results and recording or reporting them.*
- *Falsification is manipulating research materials, equipment or processes or changing or omitting data or results such as the research is not accurately represented in the research record.*
- *Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit.*

Research misconduct does not include the honest error or difference of opinion."

MSU On-Line Angel System Help

If you experience computer problems accessing this course, you can receive assistance from Angel Help which is available 24 hours a day for 7 days per week. You can call the help desk via the toll free help line at 1-800-500-1554 (from North America or Hawaii) or locally at 517-355-2345. You can also complete an Angel e-mail Contact From which can be used to ask questions, make comments and suggestions, and report problems with the MSU Angel system. These e-mails are reviewed on a regular basis and handled as quickly as possible (normal response time is 24-48 hours). The contact form can be accessed in the ANGEL system by clicking on the 'question mark' icon on the left side of the screen. It can also be accessed directly using the following link - https://contact.cl.msu.edu/contact.php?service=angel.