2014

Development of an Online Doctor of Education Program in Applied Exercise Science

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UNITED STATES SPORTS ACADEMY

DEVELOPMENT OF AN ONLINE DOCTOR OF EDUCATION PROGRAM IN APPLIED EXERCISE SCIENCE

A Dissertation Project submitted to the faculty of the United States Sports Academy in partial fulfillment of the requirements for the degree of:

Doctor of Education in Sports Management

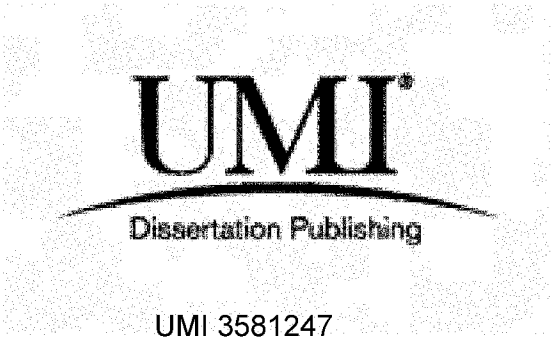
by:

David D. Peterson

Chair: Dr. Stephen Butler

Daphne, Alabama

July, 2014



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ACKNOWLEDGEMENTS

The following dissertation is a culmination of my hard work and study over the past two and a half years. However, I proudly admit that without the continued support and encouragement of others I would have never been able to complete my doctorate.

First and foremost, I would like to give thanks and praise to God for through Him all things are possible (Philippians 4:13).

Second, I would like to thank my wife (Kimberly) and two children (Hunter and Hannah) for their unwavering love and understanding throughout this journey. I am forever grateful of the many sacrifices they had to make in order for me to achieve this academic milestone.

And finally, I would like to thank my dissertation committee for their continued guidance and support; specifically, Dr. Stephen Butler, Dr. Wirt Edwards, Dr. Jordan Moon, and Dr. Fred Cromartie. Their combined efforts and contributions truly made this a rewarding and fulfilling experience.

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ABSTRACT

Peterson, D. D. (2014). Ed. D. United States Sports Academy; presented July, 2014, Title: *DEVELOPMENT OF AN ONLINE DOCTOR OF EDUCATION PROGRAM IN APPLIED EXERCISE SCIENCE.* Chair: Dr. Stephen Butler

Since its formal introduction in the 1990s, online (aka distance) learning has grown significantly in both popularity and scope. The proposed benefits of online learning are well documented in the literature and the quality of education provided is arguably the same, and in some cases potentially better, as that of traditional classroom instruction. Even so, some fields of study do not offer online degree programs at all or only at the bachelor's and master's level. The purpose of this study was to develop the first online doctoral program (Doctor of Education (EdD)) in Applied Exercise Science for accreditation and implementation at the United States Sports Academy (USSA). The paper starts with a comprehensive comparison between traditional classroom and fully online instruction. This is followed by a brief review of the EdD in Sports Management program currently employed at USSA. Next, the paper provides an extensive review of some of the different resident and online master's and doctoral programs (Doctor of Philosophy (PhD)) in Exercise Science/Physiology currently offered at four traditional 'brick and mortar' universities and three online universities. Finally, the paper introduces a proposed EdD program in Applied Exercise Science that was developed after an extensive review of the literature and traditional Exercise Science/Physiology doctoral programs already in existence. The primary purpose behind this study was to develop a sound program of study that could be completed completely online and at the convenience of the students, but at the same time, adequately prepare them for the rigors of academia and research in the field of Exercise Science.

CHAPTER I

INTRODUCTION

Since its introduction in the mid-1980s, online learning (aka distance learning) has become a popular and pervasive means of pursuing post-secondary education. It is estimated that over 90% of the public four-year institutions and 50% of private institutions in the United States now offer some form of online learning and approximately 4.6 million students have taken at least one online course (Nof & Hill, 2005; Wang & Chen, 2011). According to Nof and Hill (2005), students choose online learning over traditional classroom instruction for a variety of reasons: the program offered, pre-requisites (e.g., the ACT, SAT, and Graduate Record Examinations (GRE)), required courses, perception/reputation of the program/institution, geographic location, and delivery format (i.e., traditional, online). As online programs continue to grow in number and scope, more and more students are now opting to complete their entire undergraduate and graduate programs online. In fact, it is estimated that at least 3.7% and 8.7% of today's college graduates have completed their entire undergraduate and post-graduate degrees online, respectively (Aud, 2011).

In addition to bachelor's and master's programs, online doctoral programs, both Doctor of Philosophy (PhD) and Doctor of Education (EdD), have also grown in popularity and scope. Although the purpose and distinction between the two degrees are often confused, Kumar & Dawson (2012) argue that a PhD program is designed to prepare students to be stewards of a specific discipline whereas an EdD program is designed to prepare students to be stewards of a practical practice (aka field of study). According to this distinction, students pursuing a PhD degree are better suited for research-based careers aimed at exploring,

discovering, and disseminating new knowledge within a particular field of study. Students pursuing an EdD program, on the other hand, are better suited for careers responsible for generating and applying contextually based knowledge to improve and advance practical application (Shulman et al., 2006). In either case, most scholars agree that the underlying purpose of both doctoral programs is to adequately prepare students to be competent practitioners within their respective field of study (Carnegie Foundation, 2003).

It is often assumed that students enrolled in a doctoral program, whether PhD or EdD, will pursue an academic career after completing their respective programs. Ironically, several scholars question the effectiveness of most doctoral programs in preparing students for a career in academia. In other words, most doctoral programs are well designed and structured to prepare students for conducting research but are inadequate in preparing them for effective instruction (Lewis & Philip, 1992). Therefore, El-Gayar (2006) recommends that institutions consider redefining the purpose and scope of their doctoral programs beyond just research and include instructional methods that foster the development of the critical skills and competencies necessary for careers in academia.

Park (2011) argues that it may not be possible to offer doctoral programs, whether PhD or EdD, in an online format for certain academic disciplines - specifically those that require more hands-on/practice-based learning such as art and design. In these cases, the online environment, or virtual learning environment (VLE) as referred to by Park, can "over-generalize disciplinary characteristics and restrict creativity and experimentation in terms of pedagogical development" (Park, 2011, p. 177). In other words, according to Park, current online pedagogy methods are insufficient in teaching some of the critical skills necessary for specific disciplines. Therefore, in

order for online learning to be effective in skill-based disciplines, new pedagogy methods need to be developed and instituted in order to allow for greater student interactivity and achievement of desired learning objectives (Park, 2011). Similarly, Kim and Bonk (2006) argue that the ability to design and develop a quality online course was the most critical skill for online instructors to possess - even more than effective teaching ability.

As Park predicted, online doctoral programs in the hard sciences (e.g., chemistry, biology, and physics) are practically non-existent, even though numerous institutions offer said degrees at the bachelor's and master's level. However, in 2005, Nova Southeastern University developed and instituted the first ever hybrid doctoral program in Physical Therapy (Nof & Hill, 2005). It is a three-semester, 60 credit hour program (44 hours of independent study under faculty supervision, a comprehensive exam, and a 16 semester hour dissertation) intended to prepare graduates for careers in academia/research. The hybrid program affords students with the convenience of online learning but also includes a twice a year residency requirement (during the winter and fall semesters). Upon successful completion of all degree requirements, students are awarded a PhD in Physical Therapy (Nof & Hill, 2005).

In terms of Exercise Science, several institutions currently offer bachelor's and master's level online programs in Exercise Science (e.g., California University of Pennsylvania (Cal U), Tennessee Tech University (TTU), A. T. Still University (ATSU), Texas A&M University - Kingsville, Broadview University, Concordia University - Chicago, Concordia University - St. Paul, American Military University, and Keiser University College of Golf and Sport Management); however, none of them offer said degree online at the doctoral level. The purpose of this study was to develop an online doctoral program (EdD) in Applied Exercise Science –

making it the first online doctoral program of its kind in existence. Additionally, this study reviewed the programs of study from four resident universities (Brigham Young University, Florida State University, the University of Oklahoma, and the University of Utah) as well as three online universities (California University of Pennsylvania, Concordia University - Chicago, and A.T. Still University) that currently offer post-graduate programs in Exercise Science in an attempt to determine specific course requirements common to most Exercise Science degree programs.

Statement of the Problem

There is currently no online PhD or EdD program in Exercise Science/Physiology available for students who are interested in pursuing said degree but unable to attend a residence program.

Subproblems

The subproblems were:

1. To research and review current programs of study (both at the master's and doctoral level) of several resident and online universities offering Exercise Science degree programs.
2. To research and determine appropriate texts for each course in the proposed degree program.
3. To develop reading assignments, discussion questions, and course project requirements for each course in the proposed degree program.

Research Questions

The following research questions were formulated for this study:

1. Which terminal doctoral degree (PhD or EdD) is appropriate for the proposed program of study?
2. Who is the target audience for the proposed degree program?
3. Which universities were selected for the program of study review?
4. How were these universities selected?
5. Which courses were selected for the proposed program of study?
6. How were these courses selected?
7. Which textbooks were selected for each of the required courses?
8. How were these textbooks selected?
9. Does the program allow for an accelerated degree program option?

Definition of Terms

For the purpose of this study, the following terms were operationally defined:

Asynchronous Learning - where one student learns by working independently from other students (Creasman, 2012).

Class Space - specific area within the program infrastructure of an online course that is designed for students to come together and share ideas and is comprised of the following three sub-spaces: group discussion summary, discussion portfolios, and homework display (Wang & Chen, 2011).

Community Space - specific area within the program infrastructure of an online course that is comprised of the following five sub-spaces: sandbox, social lounge, helpdesk, information booth, and polling station (Wang & Chen, 2011).

Discussion Board (aka Forum) - is an online discussion site that allows a group of people (generally an instructor and a group of students) with a means of exchanging information on a particular topic.

Discussion Portfolio - a place within the class space infrastructure where students can post some of their previous work (Wang & Chen, 2011).

Distance Learning - any means of instruction in which teaching behaviors are separated from learning behaviors (Association to Advance Collegiate Schools of Business, 2007).

Group Discussion Summary - a place within the class space infrastructure intended to stimulate the interaction and sharing of information between student groups (Wang & Chen, 2011).

Group Space - specific area within the program infrastructure of an online course that is designated for group discussions and where the majority of learning takes place (Wang & Chen, 2011).

Helpdesk - a place within the community space infrastructure that provides a formal means for students to report technical problems or difficulties (Wang & Chen, 2011).

Homework Display - a place within the class space infrastructure that allows students to exhibit their work and share their accomplishments with other students (Wang & Chen, 2011).

Information Booth - a place within the community space infrastructure that provides a place for students to ask questions ranging from technical questions to how to submit assignments (Wang & Chen, 2011).

Online Community - a place on the Internet where a group of members (generally a group of students within the same course/institution) gather to post information and collaborate on projects through proactive participation.

Online Learning - a method of providing educational instruction and facilitating instructor-student interaction over a computer-based network (Shelton & Saltsman, 2005).

Personal Space - specific area within the program infrastructure of an online course that allows students to post their thoughts and share ideas (Wang & Chen, 2011).

Polling Station - a place within the community space infrastructure that provides instructors with a means of soliciting anonymous feedback from students about a course (Wang & Chen, 2011).

Sandbox - a place within the community space infrastructure where students can learn the specifics of and practice navigating through a particular course (Wang & Chen, 2011).

Social Lounge - a place within the community space infrastructure intended to promote and develop an online community (Wang & Chen, 2011).

Social Presence - technique used by online instructors to give students separated by time and distance the perception of "being there" (Creasman, 2012).

Synchronous Learning - group of students learn by meeting together at the same time and place (Creasman, 2012).

Teacher Space - specific area within the program infrastructure of an online course that is specifically designed and intended for instructors and is comprised of the following sub-spaces: teacher's tearoom and teacher's soapbox (Wang & Chen, 2011).

Teacher's Soapbox - a place within the teacher space infrastructure where the instructor can post lecture notes and other information on a variety of supporting topics and issues (Wang & Chen, 2011).

Teacher's Tearoom - a place within the teacher space infrastructure that allows the instructor to converse with students regarding questions or confusing issues pertaining to the course or a particular discussion topic (Wang & Chen, 2011).

Traditional Classroom Instruction - formal instruction conducted by an instructor to a group of students at an educational institution.

Scope of the Study

This study researched the master's and doctoral programs of study from various resident and online universities currently offering programs in Exercise Science. Specifically, the four universities selected were: Brigham Young University, Florida State University, the University of Oklahoma, and the University of Utah as well as three online universities (California University of Pennsylvania, Concordia University - Chicago, and A.T. Still University) that currently offer post-graduate programs in Exercise Science in an attempt to determine specific course requirements common to most Exercise Science degree programs. The degree core, research core, areas of specialization, and elective courses were compiled and compared to determine which courses were the most popular for a degree in Exercise Science.

Once all of the different courses were determined for each section (i.e., degree core, research core, areas of specialization, and electives), appropriate texts were researched, reviewed and selected for each course. Reading assignments, discussion questions, and course projects for

each course were also developed. Finally, the researcher developed a proposed program of study for an EdD in Applied Exercise Science as well as an accelerated degree program. Both degree programs were developed using the Sports Management models currently employed at the United States Sports Academy (USSA), which represent a 66 and 90 semester-hour program, respectively.

Delimitations

The delimitations for this study were:

1. The study only reviewed the programs of study from four universities offering traditional residency programs (Brigham Young University, Florida State University, the University of Oklahoma, and the University of Utah) and three universities offering online programs (California University of Pennsylvania, Concordia University - Chicago, and A.T. Still University).
2. Although there are several other degree programs that are similar in scope and practice (e.g., Kinesiology, Physical Education, Public Health), the study was restricted to reviewing only degree programs specific to Exercise Science or Exercise Physiology.

Limitations

The limitations for this study were:

1. The proposed program of study does not allow for traditional hands-on experience and practice normally afforded to students participating in traditional classroom instruction (e.g., how to perform skinfold/circumference

measurements, administer VO_{2max} testing via open-circuit indirect calorimetry, or use a Vertec to assess vertical jump performance).

2. Because this is the first online doctoral program of its kind, there is currently no available data in which to compare it to in terms of course composition and overall effectiveness (as measured by student perception and achievement of learning objectives).

Assumptions

The assumptions for this study were:

1. Students are able to learn the critical skills and competencies specific to the Exercise Science field of study in an online learning environment just as effectively as with traditional classroom instruction.
2. There is a legitimate desire and need for an online doctoral program in Exercise Science (i.e., a population of potential students exists that is interested in pursuing said degree but is currently unable to attend one of the residency programs already in existence for whatever reason).
3. That all resident master's and doctoral programs in Exercise Science/Physiology are comprised of the same, or at least similar, core courses (e.g., advanced exercise physiology, exercise testing and prescription, and cardiovascular physiology).

Significance of the Study

According to a recent American College of Sports Medicine (ACSM) poll, two thirds of American adults are now overweight or obese (Hansen, 2013). As a result, the

need for well-trained and qualified fitness and wellness professionals is at an all-time high. According to the Bureau of Labor Statistics, employment for fitness and wellness professionals is expected to grow as much as 24% by 2020, which is significantly more than the other job sectors (Hansen, 2013).

The proposed benefits of this study are twofold. First, it affords individuals who are interested in pursuing a doctoral degree in Exercise Science but have previously been unable to attend a traditional residency program with a new means of achieving their academic goals. For example, individuals whose current work schedules conflict with course times or require frequent travel thereby making attending class difficult if not impossible (e.g., active duty military). Online programs allow for greater flexibility and independence than traditional residency programs which in turn makes pursing higher education possible for more individuals.

Second, it provides USSA with a unique opportunity for significant growth both in terms of student enrollment and degree programs offered. Currently, USSA is recognized as "the largest sports university in the world" and well known for its bachelor's, master's, and doctoral programs in Sports Management. If the proposed program is approved and implemented, USSA would be the only university in the United States, and the world for that matter, offering an online doctoral degree in Applied Exercise Science.

CHAPTER II

REVIEW OF LITERATURE

The Association to Advance Collegiate Schools of Business (AACSB) defines distance learning as any means of instruction in which teaching behaviors are separated from learning behaviors. Similarly, Shelton and Saltsman (2005) define online learning as a method of providing educational instruction and facilitating instructor-student interaction over a computer-based network. Since its formal introduction in the mid-1980s, online learning has become a popular and pervasive means of administering post-secondary education. In fact, the number of college students in the United States (U.S.) enrolled in some form of online learning increased from 18% to 28% between1988 and 1990, respectively (Nof & Hill, 2005). Since then, the number of institutions offering online programs also increased significantly. In 2001, it was estimated that 89% of the public four-year institutions in the U.S. were offering some form of online instruction, representing 2.9 million students (Tallent-Runnells, 2006). By 2005, the National Center for Educational Statistics reported that 91% of the public four-year institutions and 50% of private institutions were offering, or planned to offer, online instruction (Nof & Hill, 2005). It was estimated that by 2008, approximately 4.6 million students had taken at least one online course and that 3.7% and 8.7% of college students had completed their entire undergraduate and post-graduate degree programs online, respectively (Wang & Chen, 2011; Aud, 2011). By 2010, online enrollment accounted for approximately 31% of all post-secondary enrollments in the U.S. (Allen & Seaman, 2011).

The purpose of this chapter is to discuss some of the similarities and differences between traditional classroom and online learning, potential benefits and limitations of online learning, recommendations for online course design, as well as some of the various roles and responsibilities of the institutions offering, instructors teaching, and students enrolling into online courses. Additionally, a historical context of the development and evolution of Exercise Science/Physiology as an independent academic discipline will be provided.

Traditional vs. Online Instruction

Since its inception in the 1980s, there have been skeptics that question whether online learning is as effective at providing quality instruction as traditional classroom instruction. According to Wahlstedt et al. (2008) online programs are more like "buildings" than "schools," they only provide students with a window to peek through rather than a chair for them to sit in and learn. Conversely, Nof and Hill (2005) believe the initial concern regarding the legitimacy of online learning was not with the curriculum, instructors or entrance requirements employed, but rather that online learning was not as common and accepted as it is today. Another factor that contributed to the initial concerns regarding online learning is the vast differences in academic intensity and requirements between institutions (Nof & Hill, 2005).

Online learning has come a long way since its inception. The first forms of "distance learning" involved paper-and-pencil correspondence courses and primitive one-way video communications (Prineas & Cini, 2011). According to Sparrow (2004), online learning has, over time, transitioned from more teacher-centered to more learner-centered

instruction. Additionally, Wang and Chen (2011) suggest that online learning minimizes many of the restrictions of traditional classroom instruction. Online learning provides the opportunity for instructors to be architects of their learning environment and grants them more instructional freedom and flexibility. That said, the effectiveness of online learning is still primarily measured not on its own merit but whether the learning outcomes match those achieved through traditional classroom instruction (Prineas & Cini, 2011).

Several studies suggest that online learning may be just as effective as traditional classroom instruction. Russell (1999) suggested that regardless of how the information is packaged or delivered, there is "no significant difference" in terms of student achievement between online and traditional classroom instruction. Additionally, Clark (1983) argued that the media used is irrelevant in terms of learning and what really matters is the quality of instruction provided. Temple (2008) and Wang and Chen (2011) agree and advocate that learning is a result of instruction and is unrelated to physical location.

Several recent studies have helped to substantiate this notion of "no significant difference." For example, Johnson et al. (2000) compared the performance of students taking an online graduate course with that of students taking the same course in a traditional classroom setting and found no significant differences in terms of student learning between the two courses. Similarly, Maki et al. (2000), in a two-year quasi-experimental study of undergraduate students participating in an introductory psychology course, reported greater learning for the online sections when compared to classroom-based sections as measured by exam performance. Blackley and Curran-Smith (1998)

found that nursing students taking online courses performed as well as resident students in terms of performance both in the classroom and in the field. In a survey conducted at the State University of New York (SUNY), Shea et al. (2001) reported that 41% of the students enrolled in online classes felt they learned as much as they did in traditional classes, with 47% reporting they learned more.

Researchers have also used instructor perceptions of online instruction as a measure of learning effectiveness. For example, Dobrin (1999) reported that 85% of the instructors teaching online felt that student learning in online courses was comparable to, or in some cases even better, than that of traditional classroom instruction.

That said, other studies have reported lower levels of learning associated with online courses. Chen et al. (1991) compared student performance via traditional classroom, correspondence, and online learning and found that achievement test scores were highest for correspondence and lowest for online learning. Similarly, Brown and Liedholm (2002) reported significantly lower performance on test scores for students enrolled in an online microeconomics course as compared to those students taking the same course via traditional classroom instruction. Even so, it is worth mentioning that such findings tend to be the exception in terms of evaluating online learning (Swan, 2003).

However, online courses are not the same as traditional courses and designing an effective online course is not as simple as putting instructional information on the web. Creasman (2012) proposes several differences between traditional classroom and online learning. First, online learning is often asynchronous (students work independently from

one another) whereas traditional learning is synchronous (all students meet at the same time and place). Second, online learning involves non-linear discussions (students can participate in multiple conversations simultaneously) whereas traditional learning is predicated by one person speaking at a time. Third, online learning involves instruction primarily via written discussions whereas traditional learning primarily uses oral dialog. The communication between instructor and student is slower with online learning due to separations in time and locations. As a result, online learning requires greater social presence from the instructor than is required for traditional learning. Additionally, the volume of information presented and available to students is greater with online learning than traditional learning. The material presented in traditional learning is often prepared in advance and is limited due to time constraints; however, with online learning both the instructor and students are able to draw from a seemingly limitless pool of instructional materials. Finally, the role of the instructor is different in online learning than it is in traditional learning. In online learning, the instructor is more of a facilitator of information than teacher. In fact, in some cases the instructor may even take on the role of co-learner by allowing the student to introduce new concepts or ideas into the class discussion (Edwards et al., 2011).

Advantages of Online Learning

The potential advantages of online learning are well documented in the literature. For example, Russell (2002) advocates that online learning offers an improved means of instruction by affording students more time to spend on task. Kasmin (2005) suggests that the greatest advantage of online learning is the ability to provide students with an

immediate, action-oriented, and practical learning experience. Online programs also provide significant advantages to the institutions offering them. According to AACSB (2007), online programs fundamentally change the way schools compete for students. Institutions that offer online learning also generally increase the scope and scale of their academic programs. Additionally, institutions with online programs often have several well-versed instructors in their field from all over the country, and possibly the world, as adjunct faculty, which can significantly enhance the education experience afforded to students (Nof & Hill, 2005). Karlsudd and Tagerud (2008) believe that online learning is the only viable solution for mass education.

Zaitun and Siow (2009) propose the following benefits of online learning: accessibility, flexibility, interpersonal breadth (i.e., the possibility of interaction with classmates from all over the county/world), cost, documentation (i.e., easy access to instructional materials and student records), and improved access to instructors. Similarly, Welker and Berardino (2005) summarize the advantages of online learning into four categories: ease of use, independence, advanced learning, and flexibility. In terms of ease of use, the advantages include timely submission of assignments, improved ability to interact with the instructor as well as other students, improved access to class requirements, and quicker responses from the instructor. The advantages listed for independence include more freedom in terms of scope and direction of study, less dictation from instructor on how to complete assignments, as well as the ability to know what the assignments are ahead of time. In terms of advanced learning, the proposed advantages included ability to apply assignments to personal experiences, easy access to

copious amounts of information, learning that is more action oriented, and the ability to research, meditate on, and proofread submissions prior to posting a response. Finally, the advantages for flexibility include the ability to complete coursework anywhere/anytime and the ability to work at one's own pace.

Potential Disadvantages of Online Learning

Although online learning offers some distinct advantages, there is also the potential for some disadvantages. Darabi and Jin (2013) found that poorly designed or ill-structured online discussion tasks can result in degraded learning opportunities. For example, in a study evaluating the online discussion posts of undergraduate students, Schellens and Valcke (2005) reported that less than three percent of the postings exhibited high levels of practical application of the information. Similarly, Garrison et al. (2001) reported that only 13% of the graduate students posted responses that displayed critical thinking/possible solutions and only four percent showed a critical assessment of concepts. Another study conducted by Gunawardena et al. (1997) found that 93% of the postings from graduate students showed only regurgitated information and no original thought. This supports the findings of Sing and Khine (2006), which reported 80% of graduate student posts did not go beyond sharing and comparing information. Collectively, these findings highlight the limitations of online learning as a result of poorly designed or ill-structured online discussion tasks. To compensate for this, students must spend a greater amount of time and cognitive resources on trying to

interpret the discussion's context and expectations (Darabi & Jin, 2013). As a result, they are more likely to respond with simpler posts that do not show critical thinking and application of concepts.

Kuriloff (2005) believes the biggest disadvantage of online learning is the loss of face-to-face interaction between the instructor and student. Welker and Berardino (2005) agree and add increased instructor workload and loss of traditional classroom dynamics as additional disadvantages of online learning. Imran et al. (2012) suggest it is harder for students to remain motivated in an online course than a traditional one and therefore may be more likely to fail or drop out. Shea et al. (2001) found that students with low levels of instructor interaction reported low levels of learning whereas students with high levels of instructor interaction reported higher levels of learning. Similarly, Swan et al. (1990) found a strong relationship between student interaction with instructors and their perceptions of learning.

Zaitun and Siow (2009) propose the following disadvantages with online learning: employment (e.g., some employers may question the validity of certain online degrees), communication (i.e., student interaction with instructors will primarily be through emails and discussion forums), and reduced course availability. According to Welker and Berardino (2005), the disadvantages of online learning can be summarized into four primary categories: confusion, social interaction, access, and more work. In terms of confusion, student's list unclear or incomplete instruction, being penalized for the lack of contribution from other students, inactive or malfunctioning modules, and poorly designed course infrastructure (e.g., course information posted in too many areas). The

disadvantages associated with social interaction included reduced camaraderie with fellow students, reduced or non-existent face-to-face time with instructor, and reduced team building activities. In terms of access, students reported slow responses to questions and posts, difficulty in processing multiple discussions, inability to access course materials due to intentional/unintentional closing of modules, and technical difficulties in attaching files, course navigation, or logging on. Finally, the disadvantages associated with more work included large amounts of required reading, more assignments as compared to traditional courses, perception that the exams are harder, and too much time spent on mandatory group discussions.

Online Program Infrastructure

Research suggests that the infrastructure of online programs plays an important role in determining the overall effectiveness of an online program. Preece (2000) recommended that online programs be carefully designed prior to and regularly nurtured after inception. If not, their likelihood for success is significantly diminished. According to Preece, this initial nurturing is accomplished through adequate advertising, welcoming of new students, proactive dialogue, and frequent trouble shooting of courseware. Welker and Berardino (2005) went on to say that use of technology also plays an important role in online program infrastructure. However, rather than applying the same management technology across all course elements; instructors should try and determine how and which technology would best improve the learning environment for students. Additionally, instructors should not simply adopt a particular learning tool or format

simply because it is available or familiar but rather give serious thought as to how to use the available technology to best support the learning objectives (Snyder, 2009).

Infrastructure that is poorly designed can lead to confusion and frustration for both the instructor and students. According to Wang & Chen (2011), poor online program infrastructure can lead to students using the discussion board (aka forum) for purposes other than the posting of responses/assignments. Specifically, students may use the discussion board to request assistance with technical problems, submit questions regarding coursework, practice attaching files, or post messages simply to see how the system works.

McNaught et al. (2012) reported a correlational relationship between online program design and perceived student learning outcomes. These findings suggest that well-designed online program infrastructure may actually promote enhanced learning, at least in terms of student perception (McNaught et al., 2012). Well-designed online program infrastructure may also provide added benefits for instructors. Specifically, well-designed online program infrastructure allows instructors the ability to: conduct synchronous or asynchronous discussions, administer quizzes/exams, and provide prompt grading and other forms of feedback (Prineas & Cini, 2011). Additionally, well-designed online program infrastructure can provide instructors with access to a wealth of quantitative and qualitative data that can be used to assess student performance. This includes: the total number of words typed/posts submitted, average length of posts, how often students log into a course, amount of time spent on a particular task (e.g., reading a

content page or taking a self-directed quiz), and customized statistical analyses of individual or group responses (Prineas & Cini, 2011).

According to AACSB (2007), online programs require a considerable organizational as well as financial commitment in order to be successful. Specifically: funding for technology and support services, adequate number of well-trained service technicians, counselors, site administrators, and information resources (aka library) personnel. The associated costs are staggering and often underestimated by institutions pursuing online programs (AACSB, 2007).

Wang and Chen (2011) recommend institutions consider the following five components when developing infrastructure for an online program: group space, class space, teacher space, personal space, and community space.

Group space (aka conference room) is the primary location for all group discussions and where the majority of learning takes place. In order for the group space to be effective, posts in this space should be limited to the discussion topic. According to Darabi and Jin (2013), students enrolled in online learning are required to read and interpret the discussion topic, read the postings of other students, process supporting information, and formulate a response displaying critical thinking and application. As a result, the introduction of distracting or unrelated information into the group discussion can lead to information overload and negatively affect the cognitive ability of students.

Class space (aka exhibition hall) consists of three sub-spaces: group discussion summary, discussion portfolios, and homework display. Class space is an area designed to allow students to come together and share ideas. The group discussion summary space

is intended to stimulate the interaction and sharing of information between groups. The discussion portfolios space is a place where students can post some of their previous work. Discussion portfolios help to motivate students to do their best since their contributions will be available for everyone to view. Finally, the homework display space allows students to exhibit their work and share their accomplishments with other students as well as the instructor.

Teacher space is specifically designed and intended for the instructor. Similar to class space, teacher space has sub-spaces: teacher's tearoom and teacher's soapbox. The teacher's tearoom is space that allows the instructor to converse with students regarding questions or confusing issues pertaining to the course or a particular discussion topic. That said, this space is not intended to be used as a traditional question-and-answer forum but rather a facilitator for dynamic and interactive dialogue between the instructor and students. The teacher's soapbox (aka teaching blog) is space where the instructor can post lecture notes and other information on a variety of supporting topics and issues.

Personal space (aka reflective learning blog) affords students the opportunity to freely post thoughts and ideas as they reflect upon their learning. This allows students to make learning personal, meaningful, and applicable to their professional and personal interests and goals. According to Sutton (2001), students do not have to be actively involved in a discussion in order to facilitate learning. Instead, students often participate in "vicarious interaction" in which they observe, process, and learn from the interactions of others. In fact, Sutton recommends vicarious interaction as an effective method of learning for students new to a particular topic or field of study.

Community space includes the following sub-spaces: sandbox, social lounge, helpdesk, information booth, and polling station. The sandbox (aka playground) provides a place where students can learn the specifics of and practice navigating through a particular course. It is not uncommon for students new to online learning to be completely unfamiliar with how an online course works. Here students can practice posting a reply or attaching files without fear of contaminating the class space or distracting other students. Several researchers recommend that students new to online learning be required to complete a basic familiarization course to teach them the basics of course navigation and operation prior to enrolling into their first course (Kumar & Dawson, 2012; Swan, 2003). According to Hillman et al. (1994), this learner-courseware interaction is critical in facilitating the navigation prowess necessary to access vital course content and information. Students that spend a great amount of time or mental resources on courseware interaction will have fewer resources available to devote to learning (Hillman et al., 1994). Finally, the social lounge is intended to promote and develop an online community. In the social lounge, students are free to discuss unrelated topics and ideas as well as exchange personal and professional information. The helpdesk (aka technical consultation) provides a formal means for students to report technical problems or difficulties. The helpdesk can also benefit other students by displaying the problems reported by their fellow students as well as the service technician's solution. The information booth is a place for students to ask questions ranging from technical questions to how to submit assignments. Unlike the teacher's tearoom, the information booth is intended to be used as a question-and-answer forum.

Additionally, similar to the helpdesk, the information booth provides a tangible record of previously submitted questions and their responses. Finally, the polling station provides instructors with a means of soliciting anonymous feedback from students about a course. According to Wang and Chen (2011), anonymity is critical in ensuring the feedback received is honest and sincere.

Recommendations for Online Course Design

In addition to online program infrastructure, attention should also be given to the design of the individual courses within an online program. Creasman (2012) advocates that online courses do not function the same as traditional classroom courses and effective online course design is more than simply posting information on a web page. As a result, Creason developed the following suggestions for online course design using Chickering and Gamson's (1987) Seven Principles of Good Practice in Undergraduate Education. First, have students work actively and collaboratively. Second, have students make connections between concepts. Third, make student/instructor interaction and "social presence" part of the course. Fourth, balance the amount of reading and work required with the amount of time students have to process and respond. Fifth, make sure the learning outcomes are appropriate to the technology options available. Sixth, allow up to 12 months to implement a new course. Finally, ensure the students are prepared technologically.

Creasman also provides the following recommendations for incorporating said course design principles: collaboration, connection, social presence, balance and implementation.

Collaboration. In addition to assigning individual posts, instructors should periodically require students to collaborate and formulate a group response to discussion questions. This helps to develop the online community and often brings to light new concepts and ideas. That said, instructors might need to actively pursue group collaboration. According to a study by Abras et al. (2003), only 25.6% of the students enrolled in online classes regularly participate in group discussions. Similarly, Kumar and Dawson (2012) reported that few students participate in group discussions or activities unless they are explicitly required to complete an assignment for a grade.

Connection. Creasman encourages a portion of the course be dedicated to a "media fast" – where students limit that amount of media they ingest for a week. This allows students to better connect with the course materials and concepts with fewer distractions.

Social Presence. Creasman recommends instructors call each student prior to the beginning of a course or shortly after registration. This helps put a voice to the name as well as establish a personal relationship with the student. Additionally, instructors should hold regular online office hours, maintain a personal web page, and contribute regularly to group discussions.

Balance. The course materials selected should be manageable in length so that the amount of reading required does not overwhelm the students. The cognitive load theory states that each learning task imposes a certain degree of cognitive load (Paas & van Merrienboer, 1994). This load is comprised of an intrinsic load (i.e., the complexity of the learning task), extrinsic load (i.e., inefficient instructional design), and germane

load (i.e., the amount of learner's cognitive effort devoted to the learning task). More importantly, the cognitive load theory suggests that excessive intrinsic or extrinsic load may impede learning by limiting the student's ability to process the information and focus attention (Paas & van Merrienboer, 1994).

Implementation. The online course should be checked regularly to ensure accuracy and functionality. New courses should be pilot tested in an attempt to identify non-working links, conflicting information, or malfunctioning/inactive modules.

Additionally, Foster et al. (2014) provide the following recommendations for ensuring effective online course design. First, ensure all posted information is accurate and up-to-date. One method to ensure the information posted is up-to-date and still relevant is to use links to reference web-based data rather than screencasts or screenshots. Second, make modules as visually aesthetic as possible. Although aesthetics cannot make up for issues with content and usability, an unattractive layout can be a deterrent and possibly de-motivate students. Third, provide measureable learning outcomes. Imran et al. (2012) recommend all courses provide students with the following information: detailed syllabus, explicit course goals and objectives, student expectations, and clear grading criteria. Additionally, accommodate other learning styles as much as possible. Incorporating as many learning styles as possible into the learning environment has been shown to enhance student performance and critical thinking (Andreou et al., 2013). Finally, make modules as interactive as possible. Making online learning highly interactive has been shown to be more effective at engaging students with the material (Lim et al., 2006).

Additional Recommendations

In addition to the previous recommendations regarding online program infrastructure and course design, researchers have also provided several recommendations for institutions, instructors, and students to consider in an attempt to improve the online learning experience.

Recommendations for Institutions. The Association to Advance Collegiate Schools of Business (2007) provides the following recommendations for institutions currently offering or considering online learning. First, establish and adequately staff a helpdesk aimed at providing students with timely and accurate administrative support/technical assistance. Second, acknowledge and prepare for the fact that different types of learning (e.g., group vs. individual, synchronous vs. asynchronous) may require differences in terms of the level and kind of institutional support. Third, identify and procure the appropriate type of technology to be used in support of online learning based on suitability and cost-effectiveness. The latest and greatest in technology does not always mean it is the best and most suitable choice.

Recommendations for Instructors. As previously mentioned, the role of the instructor in online learning is different from that of traditional classroom instruction. Additionally, the instructor/student relationship is also different. Although this relationship in terms of the traditional classroom setting is well documented (Madden & Carli, 1981), the same relationship in terms of online learning, however, is not yet fully understood (Swan, 2003; Wang & Chen, 2011). That said, researchers recommend that online instructors acknowledge and embrace the differences between traditional classroom and online

instruction. This includes viewing students as active learners instead of passive learners and instructors as facilitators/co-investigators instead of teachers (Abras et al., 2003; Reason, 1994; Selener, 1997).

The Association to Advance Collegiate Schools of Business (2007) provides additional recommendations for instructors of online learning. First, incorporate learning experiences aimed at targeting and tailoring to specific learning objectives and student learning styles, respectively. Second, provide clear course guidance and expectations at the very beginning of each course. Third, develop appropriate assessment strategies to periodically evaluate instructional effectiveness and student achievement.

Recommendations for Students. Similar to the instructors, students enrolled in online learning also have different roles and responsibilities than those participating in traditional classroom instruction. The Association to Advance Collegiate Schools of Business (2007) provides additional recommendations for students. First, assume greater responsibility for learning through proactive interaction with instructors, fellow students, sustained independent study, and use of and familiarity with technology. Second, take more initiative in asking questions/requesting assistance. Third, be flexible and expect technical difficulties.

American Kinesiology Association Online Courses Survey

Undergraduate and graduate level Kinesiology programs have continued to expand and evolve over the past several decades. This is due in part to its recognition as an independent academic discipline by the National Research Council in 2006. Since

then, Kinesiology enrollment in the state of California is up 50.5% over the past five years as compared to only 6.5% in overall enrollments, with similar findings reported in other states (American Kinesiology Association, n.d.).

Another contributor to the recent success of Kinesiology as an academic discipline is its expanded scientific basis and performance applications. Modern Kinesiology programs now include multiple areas of specialization to include: Biomechanics, Sociocultural Foundations of Sport, Sport and Exercise Psychology, Exercise Physiology, Motor Behavior, Physical Education Teacher Education, Athletic Training, Sport Medicine, and Sport Management (American Kinesiology Association, n.d.). This integrated and multi-faceted design has also contributed to Kinesiology's recent academic success. In fact, past experience has shown that removing or transferring one or more of these areas of specialization to other academic disciplines has proven to be a disadvantage to both the transferred faculty and to the departments to which they have been moved. Kinesiology faculty members often have little in common with other faculty members, and the gaining department may find it difficult to integrate Kinesiology-specific courses into its programs of study. For example, the University of Texas (UT) opted to move its Physical Education instructor course from the Kinesiology department to another department within the School of Education. However, UT quickly found it necessary to reassign the course back within the Kinesiology department after only a few years (American Kinesiology Association, n.d.).

In December 2013, the American Kinesiology Association (AKA) emailed an online survey to 690 different universities with a Department of Kinesiology. The

purpose of the survey was threefold: 1) institutional identification, 2) online Kinesiology course offerings, and 3) general perceptions of online courses. Of the 690 universities contacted, 101 provided responses (~15% response rate). Table 2.1 depicts the type and number of online programs offered at the universities that participated in the survey. Table 2.2 depicts the degree program course summary for the same universities.

The results of the online survey provided revealing insight as to the current state and projected future of many of undergraduate and graduate level departments of Kinesiology across the country. For example, only 42% of the faculty surveyed felt that

Table 2.1. Totally Online Degree Program Summary

	Undergraduate	Master's	Doctoral
Adapted PE/Special Populations	1	0	0
Athletic Training	1	0	0
Biomechanics	0	0	0
Coaching	0	4	0
Exercise Physiology	3	1	0
Kinesiology	7	1	0
Measurement	0	0	0
Motor Learning/Behavior	0	0	0
Physical Education	4	9	0
Sport Studies	2	0	0
Sport/Exercise Psychology	2	0	0
Sport Management	2	7	0
Other	4	4	0

t he academic rigor of online learning was as rigorous as traditional courses (40% reported

Table 2.2. Degree Program Course Summary

Adapted PE / Special Populations	75 (74%)	23 (35%)	6 (20%)	67 (89%)	16 (70%)	5 (83%)	7 (9%)	4 (17%)	1 (17%)	5 (7%)	5 (22%)	0 (0%)
Athletic Training	59 (58%)	18 (27%)	2 (7%)	57 (97%)	14 (78%)	2 (100%)	3 (5%)	1 (6%)	0 (0%)	6 (10%)	2 (11%)	0 (0%)
Biomechanics	87 (86%)	45 (70%)	18 (60%)	78 (90%)	40 (89%)	16 (89%)	9 (10%)	2 (4%)	0 (0%)	5 (6%)	2 (4%)	1 (6%)
Coaching	64 (63%)	20 (30%)	2 (7%)	55 (86%)	9 (45%)	2 (100%)	9 (14%)	3 (15%)	1 (50%)	12 (19%)	11 (55%)	1 (50%)
Epidemiology	31 (31%)	17 (26%)	11 (37%)	23 (74%)	13 (76%)	10 (91%)	4 (13%)	0 (0%)	0 (0%)	9 (29%)	3 (18%)	1 (9%)
Exercise Leadership	58 (57%)	20 (30%)	4 (13%)	54 (93%)	19 (95%)	4 (100%)	5 (9%)	1 (5%)	0 (0%)	1 (2%)	0 (0%)	0 (0%)
Exercise Physiology	94 (93%)	54 (82%)	26 (87%)	86 (91%)	51 (94%)	24 (92%)	6 (6%)	1 (2%)	0 (0%)	6 (6%)	2 (4%)	1 (4%)
Exercise Testing / Prescription	87 (86%)	43 (65%)	11 (37%)	80 (92%)	41 (95%)	11 (100%)	7 (8%)	0 (0%)	0 (0%)	4 (5%)	1 (2%)	0 (0%)
Facilities	38 (38%)	22 (33%)	3 (10%)	34 (89%)	16 (73%)	3 (100%)	3 (8%)	4 (18%)	0 (0%)	5 (13%)	8 (36%)	0 (0%)
Introduction to Kinesiology	83 (82%)	4 (6%)	1 (3%)	74 (89%)	3 (75%)	1 (100%)	11 (13%)	0 (0%)	0 (0%)	14 (17%)	1 (25%)	0 (0%)
Measurement	73 (72%)	32 (48%)	10 (33%)	63 (86%)	25 (78%)	9 (60%)	10 (14%)	5 (16%)	1 (7%)	5 (7%)	7 (22%)	1 (7%)
Motor Learning / Behavior	85 (84%)	46 (70%)	18 (60%)	80 (94%)	36 (78%)	17 (94%)	5 (6%)	4 (9%)	0 (0%)	9 (11%)	6 (13%)	0 (0%)
Physical Activity	84 (83%)	1 (2%)	0 (0%)	81 (96%)	1 (100%)	0 (0%)	7 (8%)	0 (0%)	0 (0%)	13 (15%)	0 (0%)	0 (0%)
Research Methods	54 (54%)	60 (91%)	23 (77%)	45 (83%)	47 (78%)	22 (96%)	7 (13%)	8 (13%)	2 (9%)	7 (13%)	16 (27%)	0 (0%)
Sociology of Sport	56 (55%)	32 (48%)	6 (20%)	54 (96%)	27 (84%)	6 (100%)	5 (9%)	5 (16%)	2 (33%)	15 (27%)	7 (22%)	1 (17%)
Sport / Exercise Psychology	80 (79%)	49 (74%)	17 (57%)	72 (90%)	42 (86%)	16 (94%)	8 (10%)	4 (8%)	1 (6%)	18 (23%)	9 (18%)	0 (0%)
Sport Management	46 (46%)	36 (55%)	9 (30%)	42 (91%)	30 (83%)	8 (89%)	5 (11%)	6 (17%)	2 (22%)	15 (33%)	15 (42%)	0 (0%)
Teaching / Pedagogical Methods	76 (75%)	41 (62%)	12 (40%)	71 (93%)	30 (73%)	11 (92%)	7 (9%)	7 (17%)	2 (17%)	1 (1%)	12 (29%)	0 (0%)
Other	47 (47%)	25 (38%)	12 (40%)	38 (81%)	20 (80%)	12 (100%)	14 (30%)	6 (24%)	1 (8%)	20 (43%)	5 (20%)	1 (8%)

** Percentages may be greater than 100% as some courses may be offered in multiple formats.*

online courses were less rigorous, 9% did not know, and 9% responded not applicable). Table 2.3 provides the general impression of both Kinesiology faculty and students in terms of online learning.

Table 2.3. General Impression to Online Courses

Don't Know	3%	9%
Very Negative	4%	1%
Negative	13%	7%
Neutral	44%	29%
Positive	32%	47%
Very Positive	4%	7%

Additionally, only 49% of the respondents said their university offered funding or release time for faculty to develop/modify online courses. Only 37% of the respondents said their university allocated funding to incentivize the offering of online programs/courses. Table 2.4 shows different universities' plans for incorporating online courses over the next 5-10 years.

Table 2.4. Universities' Plan to Incorporate Online Courses in Next 5-10 Years

Almost Totally Online	1%
Many Online Courses	31%
Some Online Courses	65%
No Online Courses	3%

The Evolution of Exercise Science/Physiology

Unlike some of the other science-based disciplines (e.g., Chemistry, Biology, and Physics) that have been well established for centuries, Exercise Science/Physiology is a relatively new academic discipline. Its beginnings can be traced back as recently as the

second half of the nineteenth century and has its roots in Physical Education (Foss & Keteyian, 1998).

In 1891, Harvard University created the Department of Anatomy, Physiology, and Physical Training and established the first formal exercise physiology laboratory in the United States. The new department was the first degree program to offer a bachelor of science in Anatomy, Physiology, and Physical Training. The curriculum included courses in Exercise Physiology, Zoology, Animal and Human Morphology, Anthropometry, Applied Anatomy and Animal Mechanics, Medical Chemistry, Comparative Anatomy, Remedial Exercises, Physics, Gymnastics and Athletics, and the History of Physical Education. The program was designed to prepare students for medical school or professions as gymnasium directors or Physical Education teachers (McArdle, 2010).

Then in 1927, Dr. Lawrence Henderson opened the Harvard Fatigue Laboratory. Although the lab closed in 1947, it served as a major catalyst for future exercise-related research as well as the establishment of additional exercise physiology laboratories such as George Williams College in 1923, the University of Illinois in 1925, Springfield College in 1927, and University of California - Berkeley in 1934 (McArdle, 2010; Robergs & Roberts, 1997).

In 1964, Dr. Franklin Henry, a professor of Physical Education at the University of California - Berkeley, championed the academic need for Physical Education in his article entitled "Physical Education-An Academic Discipline" (Siedentop, 2009). Henry's article forced institutions to reconsider/redefine their physical education

programs and facilitated significant changes in the physical education curriculum. As a result, institutions started offering graduate programs with areas of specialization (e.g., Sport Sociology, and Biomechanics) and undergraduate courses in a variety of sub disciplines (e.g., Kinesiology, Motor Control/Learning, Sport Psychology, Sport Sociology, Sport History, and Sport Philosophy); with the Exercise Science/Physiology being the most prominent of the sub disciplines to emerge (Siedentop, 2009).

By the 1970s, Exercise Science/Physiology began to emerge from simply a class offered within the Physical Education curriculum into an academic discipline all its own (Robergs & Roberts, 1997). The role of Exercise Science/Physiology was no longer limited to how exercise could improve sport and athletic performance; it exploded into a myriad of new studies exploring how exercise can alter the structure and function of the human body (Robergs & Roberts, 1997).

By the late 1980s and early 1990s, Exercise Science/Physiology had continued to develop and began to include research in the areas of Biochemistry of Exercise, Clinical Exercise Physiology, Endocrinology, Molecular Biology, and Aging (Foss & Keteyian, 1998; Siedentop, 2009). As a result, several institutions began to change the name of their academic programs to Sports Medicine, Kinesiology, Athletic Training, or some derivative thereof to better represent their new area of specialization. However, offering such a wide variety of subspecialties has placed a tremendous burden on these institutions to ensure the fundamental purpose of their new programs was not lost in the transition process (Foss & Keteyian, 1998). Many researchers believe that the field of Exercise Science/Physiology will continue to evolve in the future to include research in the areas

of Molecular Biology, Biochemistry, Neurophysiology, Cardiology, Pulmonary Physiology, and Endocrinology (Robergs & Roberts, 1997).

The next logical step required for Exercise Science/Physiology to continue evolving as an independent academic discipline is for online degree programs to be developed and implemented in addition to the resident programs already in existence. The need for institutions to develop and offer online degree programs is clearly evident by the ever-increasing rise in student enrollment into online programs. The development of said programs has already been manifested at the bachelor's and master's level. Specific examples include the Exercise Science/Physiology programs at California University of Pennsylvania, Concordia University - Chicago, and A.T. Still University. However, no institution currently offers an online degree program at the doctoral level (either PhD or EdD).

Conclusion

Since the inception of online learning in the 1980s, questions have been raised as to its validity and effectiveness – especially in terms of how it compares to traditional classroom instruction. The vast majority of research suggests that online learning is generally equivalent to traditional classroom instruction (Russell, 1999). However, online learning also has some unique characteristics (e.g., medium used to deliver course information) that may contribute to or constrain particular types of learning (Oaks, 2002). Therefore, in order for online learning to be successful, adequate amounts of time and resources need to be allocated to program infrastructure, course design, and instructor training. Research has shown that the quality of course design is positively correlated

with the student's perception of learning. Online courses should be interactive, collaborative, and constructive (Snyder, 2009). As a result, the process of effective course design, implementation, and maintenance becomes imperative and perpetual (Abras et al., 2003; McNaught et al., 2011). Never before have the institutions/instructors had this much freedom to build and mold the learning environment (Wang & Chen, 2011).

CHAPTER III

METHODOLOGY

The purpose of this study was twofold. First, conduct a thorough review of the programs of study, both at the master's and doctoral level, from several different universities currently offering advanced degrees in Exercise Science or Exercise Physiology. Second, develop a proposed program of study for an online doctoral program (EdD) in Applied Exercise Science. This chapter depicts the methodology used in the study. This chapter consists of two sections: 1) the universities selected for program of study review; and 2) the procedures used to develop the proposed program of study. Due to the nature and purpose of the study, data collection via specific instrumentation/apparatus or post data collection statistical analysis was not necessary/required.

Universities Selected

The researcher began by conducting an extensive web search for a comprehensive listing of universities offering masters and doctoral level degree programs in Exercise Science or Exercise Physiology. Table 3.1 provides a comprehensive listing of all of the universities with traditional resident Exercise Science/Physiology or equivalent programs (e.g., Physiological Science, Applied Physiology, or Human Performance Science) that were reviewed. The programs of study and student handbooks from the following universities were selected: Brigham Young University (BYU), Florida State University (FSU), the University of Oklahoma (OU), and the University of Utah (UofU). These four universities were selected due to the fact that their programs of study, for both the master's and doctoral level programs, were similar in purpose and scope yet had notable differences in the courses offered. Additionally, the researcher conducted an extensive web search for universities with online master's programs in Exercise

Science/Physiology. The following online programs were selected and reviewed: California University of Pennsylvania (Cal U), Concordia University - Chicago, and A.T. Still University.

Table 3.1. Listing of Universities with Resident MS and PhD Degree Programs in Exercise Science/Physiology

University	Degree Program Offered
University of California - Los Angeles	Physiological Science
Colorado State University	Health and Exercise Science
University of Northern Colorado	Sport and Exercise Science
Florida State University	Nutrition, Food, and Exercise Sciences
University of Florida	Applied Physiology
Georgia Institute of Technology	Applied Physiology
Ball State University	Physical Education, Sport and Exercise Science
University of Kansas	Health, Sport and Exercise Sciences
East Carolina University	Exercise and Sport Science
University of North Carolina - Chapel Hill	Exercise and Sport Science
North Dakota State University	Health, Nutrition, and Exercise Sciences
University of Mary	Human Performance Sciences
University of New Mexico	Health, Exercise and Sports Sciences
Kent State University	Exercise, Leisure and Sport
Ohio State University	Exercise Science
Oklahoma University	Health and Exercise Science
University of Oklahoma	Health and Exercise Science
Oregon State University	Nutrition and Exercise Sciences
University of Oregon	Human Physiology
University of South Carolina	Exercise Science
University of Tennessee - Knoxville	Exercise, Sport and Leisure Studies
Baylor University	Health, Human Performance and Recreation
University of Houston	Health and Human Performance
Brigham Young University	Health and Human Performance/Exercise Science
University of Utah	Exercise and Sport Science

Procedures

After researching and compiling the programs of study from various resident and online universities, the researcher developed a comprehensive table allowing for a side-by-side comparison of the different programs. Table 3.2 provides a comprehensive listing of the four resident programs of study in Exercise Science/Physiology at the master's level. Table 3.3

provides a comprehensive listing of the three online programs of study in Exercise Science/Physiology at the master's level. Table 3.4 is a copy of the United States Sports Academy's (USSA) Master of Sports Science in Sports Health & Fitness program of study. Table 3.5 provides a comprehensive listing of the four resident programs of study at the doctoral level.

The researcher then identified which courses were most commonly offered and best suited for an equivocal online program in Applied Exercise Science. Prior to course selection, special consideration was paid to each of the potential courses to ensure they could be effectively delivered in an online format without significantly increasing the quantity of information required or jeopardizing the quality of instruction provided.

Since USSA already employs a 66-semester hour EdD online program in Sports Management, that program of study was used to develop a template for the proposed program of study in Applied Exercise Science. The USSA's EdD in Sports Management program of study is comprised of the following: general core (18 credit hours), research core (9 credit hours), an area of specialization (6 credit hours), cognate transfer courses (6 credit hours), electives (9 credit hours), doctoral mentorship (6 credit hours), and dissertation (12 credit hours). The entire EdD in Sports Management program of study is provided in Appendix A.

Table 3.2. Programs of Study for Various Resident MS Exercise Science/Physiology Programs

Exercise Sciences Core (13)	**Core**	**Core (9)**	**1st Year, 1st Semester**
STAT 511 Statistical Methods for Research 1 (3)	HUN 5802 Research Design and Methodology (2)	HES 5823 Adv. Exercise Phys. (3)	ESS 6300 Adv. Exercise Phys. I Lecture (3)
EXSC 630 Research Methods (3)	HUN 5802L Research Design and Methodology Lab (1)	HES 5833 Adv. Exercise Phys. Lab (3)	ESS 6301 Adv. Exercise Phys. I Lab (3)
EXSC 691 Seminar (1)	*OR*	HES 5853 Health Fitness: Theory & Application (3)	ESS 7102 Intro to Research Methods (3)
EXSC 699R Thesis (6)	CHD 5915 Research Methods (4)	**Research Technology (12)**	**1st Year, 2nd Semester**
Exercise Phys. Specialization (7)	HUN / FOS / PET 6930 Seminar (1)	HES 5953 Research Methods in HES (3)	ESS 6310 Adv. Exercise Phys. II Lecture (3)
EXSC 666 Exercise Phys. (3)	PET 5930 Seminar (1)	HES 5963 Statistical Applications in HES (3)	ESS 6311 Adv. Exercise Phys. II Lab (3)
EXSC 667 Lab Methods and Procedures (2)	PET 5930 Seminar (1)	HES 5980 Thesis (6)	ESS 7103 Experimental Design and Analysis I (3)
EXSC 669 Exercise Testing and Prescription (2)	HUN 6940 Supervised Teaching (1)	**Electives (9)**	**2nd Year, 1st Semester**
No Specialization (14)	PET 5355C Adv. Exercise Phys. (3)		FDNU 6440 Macro-Nutrient Metabolism (3)
EXSC 663 Research Techniques in Biomechanics of Sport (2)	PET 5367 Nutrition and Exercise Performance (3)		ESS 6320 Exercise and Disease (3)
	PET 5553 Cardiorespiratory Evaluation (3)		ESS 7850 Graduate Seminar (1)
EXSC 666 Exercise Phys. (3)	**One of the Following Statistics Courses:**		Statistics (3-4)
EXSC Lab Methods and Procedures (2)	EDF 5400 Basic Descriptive Statistics (4)		**2nd Year, 2nd Semester**
EXSC 668 Orthopaedic Anatomy (4)	STA 5126 Intro. To Applied Statistics (3)		ESS 6970 Thesis Research (6)
EXSC 671 Adv. Lifestyle and Chronic Disease Prevention (3)	FAD 5934 Applied Research in CHS (4)		Statistics (3-4)
	Two or Three from the Following:		
Electives (6-11)	PET 5077 Physical Dimensions of Aging (4)		
EXSC 560 Orthopaedic Pathomechanics (2)	PET 6317 Skeletal Muscle Structure and Function (4)		
EXSC 625R Adv. Topics in Physical Med & Rehab (2)	PET 6365 Exercise and the Cardiorespiratory System (4)		
	PET 6368 Metabolic Aspects of Exercise (3)		
EXSC 661 Adv. Worksite Wellness (3)	PET 6386 Environmental Aspects of Exercise (3)		
EXSC 662 Mechanical Analysis of Activities (2)	PET 6387 Endocrinology (3)		
EXSC 663 Research Techniques in Biomechanics of Sport (2)	PET 6388 Exercise and Disease (3)		
	PET 5751 Sports Fitness Testing (3)		
EXSC 669 Exercise Testing and Prescription (2)	PET 5389 Strength Program Development (3)		
EXSC 670 Basic Electrocardiography (2)	PET 5653 Cardiovascular Program Development (3)		
EXSC 671 Adv. Lifestyle and Chronic Disease Prevention (3)	PET 5216 Sport Psychology (3)		
	PET 5054C Motor Skill Learning (3)		
EXSC 673 Adv. Obesity and Weight Management (3)	PET 5603 Models of Health Behavior (3)		
	Thesis Option		
EXSC 693R Graduate Seminar in Readings (1)	HUN 5906 Directed Individual Study (2)		
EXSC 766 Adv. Exercise Phys. – Cardiopulmonary (3)	HUN 5971 Thesis (6)		
	Elective (3)		
EXSC 769 Adv. Exercise Phys. – Skeletal Muscle (3)	**Non-Thesis Option**		
	HUN 5906 Directed Individual Study (2)		
CHEM 481 Biochemistry (3)	PET 8945 Exercise Phys. Internship (9)		
PDBio 565 Endocrinology (3)	Electives (9)		

Table 3.3. Programs of Study for Various Online MS Exercise Science/Physiology Programs

Core Courses (24)	Core Courses (18)	Kinesiology Core
PRF 700 Orientation to Exercise Science and Wellness	Functional Anatomy	KINE 5000 Evidence-Based Practice and Research Methods
PRF 701 Advanced Topics in SAQ and Endurance Training	Functional Biomechanics	KINE 5001 Motor Control
PRF 705 Industrial, Clinical and Corporate Wellness	Research Design and Methods in Exercise Science	KINE 5002 Exercise Science
PRF 715 Business and Entrepreneurship in the Fitness Industry	Applied Exercise Physiology	KINE 5003 Functional Anatomy
PRF 720 Essentials of Human Movement Science	Exercise and Sport Nutrition	KINE 5004 Functional Biomechanics
PRF 760 Leadership and Professional Development	Capstone	KINE 5005 Exercise and Sport Related Nutrition
PRF 765 Nutrition for Peak Performance	Human Movement Science Concentration (12)	KINE 5006 Summer Institute
PRF 770 Exercise Physiology: Assessment and Exercise Prescription	Principles of Human Movement Science	KINE 5100 Advanced Fitness Nutrition
Performance Enhancement and Injury Prevention Track (12)	Program Design in Corrective Exercise Training	KINE 5101 Advanced Exercise Prescription
PRF 810 Research in Performance Enhancement	Practicum: Human Movement Science	KINE 5102Current Topics in Human Movement
PRF 710 Performance Enhancement in Physical Activity	Special Topics Seminar in Human Movement Science	Thesis Option (taken in place of 5100, 5101, 5102)
PRF 750 Performance Enhancement Program Design	Fitness and Health Promotion Concentration (12)	KINE 7000 Research Statistics
PRF 780 Current Topics in Performance Enhancement	Principles of Fitness and Health Promotion	KINE 7001 Thesis I
Wellness and Fitness Track (12)	Program Design in Fitness and Health Promotion	KINE 7002 Thesis II
PRF 800 Research in Fitness and Wellness	Practicum: Fitness and Health Promotion	KINE 7003 Thesis III
PRF 711 An Integrated Approach to Fitness and Wellness	Business Development and Entrepreneurship in Fitness and Health Promotion	Sports Conditioning Track
PRF 751 Program Design in Fitness and Wellness	Sports Performance Training Concentration (12)	KINE 6000 Measurement of Sports Fitness
PRF 781 Current Topics in Fitness and Wellness	Principles of Sports Performance Training	KINE 6001 Speed, Agility, and Quickness
Rehabilitation Wellness Track (12)	Program Design in Sports Performance Training	KINE 6002 Muscular Fitness Development
PRF 820 Research in Rehabilitation	Practicum: Sports Performance Training	KINE 6003 The Science and Practice of Metabolic Conditioning
PRF 712 Corrective Exercise in Rehabilitation	Special Topics Seminar in Sports Performance Training	Exercise and Sports Psychology Track
PRF 752 Corrective Exercise Program Design	Seminar in Sports Performance Training	KINE 6100 Psychology, Physical Activity, and Health
PRF 782 Current Topics in Rehabilitation	Sports Nutrition Concentration (12/15)	KINE 6101 Applied Sport Psychology
Sport Psychology Track (12)	Exercise and Sports Nutrition	KINE 6102 Exercise and Mental Health
PRF 713 Special Topics in Sport Psychology	Vitamins and Minerals	KINE 6103 Principles of Adherence and Motivation
PRF 753 Psychological Aspects of Sport Injury and Rehabilitation	Nutrition and Exercise for Weight Management	Geriatric Exercise Sciences Track
PRF 783 Psychological Perspectives in Sport Performance Enhancement and Intervention	Practicum: Sports Nutrition	KINE 6200 Psychosocial Dimensions of Aging
PRF 830 Research in Sport Psychology	Current Trends in Sports Nutrition	KINE 6201 Exercise Prescription for Older Adults
Wellness Coaching Track (12)		KINE 6202 Physical Dimensions of Aging
PRF 714 Health and Wellness Coaching Competencies		KINE 6203 Motivational Strategies for Physical Activity among Older Adults
PRF 754 Health and Wellness Coaching - Facilitating Change		Corrective Exercise & Orthopedic Rehabilitation Track
PRF 784 Current Topics in Wellness Coaching		KINE 6300 Human Movement Dysfunction
PRF 840 Research in Health and Wellness Coaching		KINE 6301 Functional Assessment for Development of Corrective & Post Rehabilitation Exercise Programs
		KINE 6302 Post Rehabilitation Exercise
		KINE 6303 Corrective Exercise Programming

Table 3.4. USSA Master of Sports Science in Sports Health & Fitness Program of Study (33 Semester Hours)

Core Courses	***Credit Hours***	***Hours***	***Semester***	***Grade***
SAB 561 Contemporary Issues in Sports	3			
SAM 543 Sports Administration	3			
SAM 544 Sports Marketing	3			
Major Courses	***Credit Hours***	***Hours***	***Semester***	***Grade***
SAD 556 Issues in Nutrition and Health	3			
SAR 520 Exercise Physiology	3			
SAR 525 Sports Strength and Conditioning	3			
SAR 580 Exercise Testing and Prescription	3			
Mentorship	***Credit Hours***	***Hours***	***Semester***	***Grade***
Mentorship – 450 Contact Hours	9			
Elective. Select one of the following courses.	***Credit Hours***	***Hours***	***Semester***	***Grade***
SAD 546 Seminar in Sports Medicine	3			
SAB 566 Psychological Aspects of Health and Fitness Programming	3			
SAR 587 Management Strategies in Health and Fitness	3			

Emphasis Courses Olympism, NCAA Compliance, Recreation Management, Sports Psychology, Personal Training, Sports Hospitality Management	
Core Courses and Major Courses are to be selected from the appropriate Major Course of Study (e.g., Sports Coaching, Sports Health and Fitness, Sports Management, or Sports Studies). Emphasis courses may be selected as follows (all are 3 semester hours).	
Emphasis in Olympism	***Emphasis in NCAA Compliance***
SAB 651 Issues in the Olympic Movement	SAM 523 NCAA Compliance
SAB 622 Structure and Function of the Olympic Games	SAM 524 NCAA Compliance
SAB 667 Olympism	SAM 592 Intro to the Business of Sports Agents
Emphasis in Recreation Management	***Emphasis in Sports Psychology***
SAM 535 Introduction to Parks, Recreation and Tourism	SAB 563 or SAB 556
SAM 536 Philosophy and History of Recreation and Leisure	SAB 657 Psychology of Elite Performance
SAM 537 Introduction to Recreational Sport Management	SAB 659 Group Dynamics in Sports and Exercise
Emphasis in Personal Training	***Emphasis in Sports Hospitality Management***
SAR 526 Personal Training	SAM 530 Food and Beverage Service Management
SAD 556 Issues in Nutrition and Health	SAM 534 Membership and Marketing for Sports Clubs
SAR 587 Management Strategies in Health and Fitness	SAM 553 Sports Club Management
* Students who are Sports & Fitness majors or dual majors (only) must substitute SAD 546 Seminar in Sports Medicine for SAD 556 in the Personal Training Emphasis	

Table 3.5. Programs of Study for Various Resident PhD Exercise Science/Physiology Programs

Research Core (27-31)	**Core (4)**	**Interdisciplinary Core (4)**	**1st Year, 1st Semester**
EXSC 691 Graduate Seminar (1)	HOE 6366 Research Best Practices in Human Sciences (2)	HES 6970 Seminar in Health and Exer. Science (HES) (1)	ESS 7300 Adv. Exer. Phys. I Lecture (3)
EXSC 693R Graduate Seminar Readings (2-6)			ESS 7301 Adv. Exer. Phys. I Lab (3)
	HUN 6906 Directed Individual Study (3)	HES 6970 Seminar in HES (1)	ESS 7102 Introduction to Research Methods (3)
EXSC 751 Doctoral Seminar: Prof & Scholarly Writing (1)	HUN 6911 Supervised Research (3)	HES 6970 Seminar in HES (1)	
	PET 6930 Seminar (3)	HES 6970 Seminar in HES (1)	**1st Year, 2nd Semester**
EXSC 753 Doctoral Seminar: Res & Grantsmanship (1)	HUN 6940 Supervised Teaching (3)	**Research Core (21)**	ESS 7310 Adv. Exer. Phys. II Lecture (3)
	Required Electives (20)	HES 6990 Independent Study in HES (3)	ESS 7311 Adv. Exer. Phys. II Lab (3)
EXSC 797R Individual Research & Study (4)	PET 6368 Metabolic Aspects of Exer. (3)	HES 6980 Research for Dissertation (12)	ESS 7103 Experimental Design and Analysis I (3)
	PET 6386 Environmental Aspects of Exer. (3)	Graduate Statistics I (3)	
EXSC 799R Dissertation (18)		Graduate Statistics II (3)	**2nd Year, 1st Semester**
Exer. Phys. Specialization	PET 6387 Endocrinology (3)	**Extended Core for Exer. Phys. (21)**	ESS 7104 Experimental Design and Analysis II (3-4)
EXSC 666 Exer. Phys. (3)	PET 6317 Skeletal Muscle Structure & Function (4)	PHYO 5016 or 2 three-hour graduate courses approved by Doctoral Advisory Committee	Electives/Independent Study (6-9)
EXSC 667 Exer. Phys. Lab Methods (2)			**2nd Year, 2nd Semester**
EXSC 669 Exer. Testing & Prescription (2)	PET 6365 Exer. & the Cardiorespiratory System (4)		Electives/Independent Study (6-9)
		CHEM 3563 Biochemistry (3)	Statistics Elective (3-4)
EXSC 766 Adv. Exer. Phys. Cardiopulmonary (3)	PET 5367 Nutrition & Exer. Performance (3)	HES 6823 Cardiorespiratory Exer. Phys. (3)	**3rd Year, 1st Semester**
EXSC 769 Adv. Exer. Phys. Skeletal Muscle (3)	**Dissertation (24)**	HES 6833 Human Body Composition (3)	ESS 7970 Dissertation Research (3)
	HUN 8964 Preliminary Doctoral Examination (0)	HES 6833 Neuromuscular Phys. (3)	ESS 7850 Graduate Seminar (1)
PDBio 565 Endocrinology (3)		HES 6883 Endocrinology & Metabolism of Exer. (3)	Electives/Independent Study (6-8)
Supporting Areas (17)	HUN 6980 Dissertation (24)		**3rd Year, 2nd Semester**
Phys. & Developmental Biology	HUN 8985 Dissertation Defense (0)	**Electives (8-20)**	ESS 7970 Dissertation Research (3-6)
Health/Wellness	**Required Related Area (6)**		Electives/Independent Study (3)
Nutrition	BMS 6511 Organ Phys. (6)		**4th Year, 1st Semester**
Biomechanics	**Statistics (7)**		ESS 7970 Dissertation Research (6-10)
	EDF 5401 General Linear Models (4)		**4th Year, 2nd Semester**
	EDF 5402 Analysis of Variance (3)		ESS Faculty Consultation (3)
	Electives (9)		ESS 7970 Dissertation Research (6-9)

Once the different courses for the proposed program of study were determined, the researcher then conducted an extensive online review of textbooks from multiple publishers to identify a suitable text for each of the selected courses. The researcher also solicited the input from several of the resident and distance learning faculty at USSA for their recommendations in terms of textbook selection. Although the final textbooks selected came from three different publishers, all but two of the texts were from Human Kinetics. The decision to use Human Kinetics as the primary publisher for the proposed program of study was based on the following rationale. First, Human Kinetics was the most willing of all publishers contacted to provide copies of requested textbooks for review. Second, Human Kinetics had the largest selection of texts for each of the proposed courses. Finally, USSA already had an account with Human Kinetics – which was not the case with all of the publishers selected (e.g., Linus Learning). Table 4.2 provides a comprehensive listing of all the textbooks selected (to include textbook and EBook ISBNs) as well as publisher information for the proposed program of study.

Next, the researcher conducted a thorough review of each text and developed reading assignments, discussion questions, and class paper requirements for each of the proposed courses. Similar to the program of study, the researcher used the course structuring (i.e., a five unit format) from the EdD in Sports Management program as the course design template for the proposed program of study. In addition, the researcher obtained a copy of and followed the recommendations set forth in USSA's Doctor of Education Course Writing Guide. Finally, the researcher conducted an extensive literature review in an attempt to identify online course development best practices and lessons learned.

CHAPTER IV

RESULTS

The main purpose of this research was to develop a program of study for a proposed online doctoral degree (EdD) in Applied Exercise Science.

In order to develop the proposed program of study, the research questions were examined and answered. The research questions were: (1) Which terminal doctoral degree (PhD or EdD) was selected for the proposed program of study?; (2) Who is the target audience for the proposed degree program?; (3) Which universities were selected for the program of study review?; (4) How were these universities selected?; (5) Which courses were selected for the proposed program of study?; (6) How were these courses selected?; (7) Which textbooks were selected for each of the required courses?; (8) How were these texts selected?; and (9) Does the program allow for an accelerated degree program option?

The following procedures were used to investigate and answer the research questions:

(1) The researcher first researched and compiled the programs of study from four different universities offering both a resident master's and doctoral program in either Exercise Science or Exercise Physiology. Additionally, the researcher researched the programs of study from three universities offering an online master's program in either Exercise Science or Exercise Physiology.

(2)

(3) The researcher then developed comprehensive tables allowing for a side-by-side comparison of the different programs and identified which courses were the most common to all seven programs of study. From this, the researcher selected courses deemed appropriate and suitable for an online doctoral program in Applied Exercise Science and constructed a proposed program of study. Since USSA already employs a 66-semester hour online EdD program in Sports Management, that program of study was used as a template in constructing the proposed program of study.

(4) Next, the researcher conducted an extensive online review of textbooks from multiple publishers to identify the specific texts to be used for each course. The researcher also solicited input from several of the resident and distance learning faculty at USSA for their recommendations in terms of textbook selection.

(5) The researcher then requested copies of each of the proposed textbooks from the different publishers, conducted a thorough review of each text, and developed reading assignments, discussion questions, and final paper requirements for each of the proposed courses. Similar to the program of study, the researcher used the course format from the EdD in Sports Management program as a template for course development. In addition, the researcher obtained a copy of USSA's Doctor of Education Course Writing Guide and conducted an extensive literature review for recommendations on online course development as additional guidance.

Universities Selected

The programs of study and student handbooks from the following four universities with resident master's and doctoral programs in Exercise Science/Physiology were selected and reviewed: BYU, FSU, OU, and UofU. These four universities were selected due to the fact their programs of study, both at the master's and doctoral level, were similar in purpose and scope yet had notable differences in the courses offered. Additionally, the following three universities with online master's programs in Exercise Science/Physiology were selected and reviewed: Cal U, Concordia University - Chicago, and ATSU.

Research Questions

Research Question 1:

Which terminal doctoral degree (PhD or EdD) was selected for the proposed program of study? An EdD degree was pursued instead of a PhD for the following reasons: 1) the researcher opted to use the EdD in Sports Management degree program currently employed by USSA as a template for the proposed program of study; and 2) USSA only has accreditation, through the Southern Association of Colleges and Schools Commission on Colleges, to provide EdD degrees.

Research Question 2:

Who is the target audience for the proposed degree program? The proposed degree program is tailored to and intended for potential students interested in pursuing an online doctoral degree in Applied Exercise Science.

To determine the target audience for the proposed degree program, the researcher used the same classification and degree concentration as the Kinesiology and Applied Physiology master's program at Rutgers University. Specifically, Rutgers University

currently offers master's programs in Kinesiology and Applied Physiology, Exercise Science, and Exercise Physiology. The Kinesiology and Applied Physiology program requires three less labs and nine additional electives as compared to the other programs. This approach reduces the number of labs required to fulfill degree requirements as well as provides increased flexibility in terms of elective courses. The Exercise Science program is more clinically focused and requires the following five courses with a behavioral emphasis (which are not included in the Exercise Physiology option): General Psychology, Psychology of Sport and Exercise, Motor Learning, Movement Experiences for Individuals with Disabilities, and either a Management or Administration course. The Exercise Physiology program is more research oriented and requires the following five courses with a quantitative emphasis (which are not included in the Exercise Science option): Risk Management, Biomechanics, Biochemistry of Exercise, Advanced Exercise Physiology Seminar, and EKG Interpretation (Rutgers University, n.d.).

Research Question 3:

Which universities were selected for the program of study review? The programs of study and student handbooks were evaluated from the following four universities with traditional resident programs in Exercise Science/Physiology: BYU, FSU, OU, and UofU. Additionally, the programs of study were evaluated from the following three universities with online programs in Exercise Science/Physiology: Cal U, Concordia University - Chicago, and ATSU.

Research Question 4:

How were these universities selected? The researcher conducted an extensive online search to identify universities that offered master's and doctoral degree programs in Exercise Science. Table 3.1 provides a listing of the 25 universities with traditional resident programs in Exercise Science/Physiology or equivalent programs that were reviewed. From those, the researcher selected BYU, FSU, OU, and UofU because the purpose and scope of their programs of study were in line with those of the proposed program of study in Applied Exercise Science. Each program of study offered slightly different general core and elective courses. The researcher felt these differences were necessary in order to ensure a broad range of courses were reviewed and considered when developing the proposed program of study. Additionally, the researcher selected the following universities with online programs in Exercise Science/Physiology: Cal U, Concordia University - Chicago, and ATSU. These three universities were selected due to the limited number of online master's programs available with an emphasis in Exercise Science/Physiology.

Research Question 5:

Which courses were selected for the proposed program of study? Table 4.1 is the proposed program of study for an EdD in Applied Exercise Science. Appendix B provides the proposed course descriptions for the general core courses. Appendix C provides the proposed course descriptions for the elective courses. Appendix D provides the proposed course modules for the general core courses. Appendix E provides the proposed course modules for the elective courses.

Research Question 6:

How were these courses selected? The researcher conducted a thorough review of the programs of study and student handbooks from various resident and online universities in an attempt to identify which courses were common to all degree programs. Additionally, the content and learning objectives for each course was carefully considered to ensure compatibility and suitability for an online format.

Table 4.1. Doctor of Education in Applied Exercise Science Program of Study (66 Semester Hours)

General Applied Exercise Science Core	***Credit Hours***	***Hours***	***Semester***	***Grade***
SAR 710 Advanced Exercise Physiology	3			
SAR 720 Advanced Strength & Conditioning	3			
SAR 730 Advanced Exercise Testing and Prescription	3			
SAR 760 Environmental Exercise Physiology	3			
SAR 770 Exercise Epidemiology	3			
SAR 780 Advanced Sports Nutrition	3			
Doctoral Research Core	***Credit Hours***	***Hours***	***Semester***	***Grade***
SAR 674 Research Statistics in Sport	3			
SAR 776 Research Methodologies	3			
SAR 790 Selected Readings in Sport	3			

Area of Specialization (6 Hours). Select one area.	***Credit Hours***	***Hours***	***Semester***	***Grade***
Human Anatomy & Physiology (select both courses)				
SAR 740 Cardiovascular Physiology	3			
SAR 745 Muscle Physiology	3			
Exercise Biochemistry (select both courses)				
SAR 750 Exercise Endocrinology	3			
SAR 755 Exercise Metabolism	3			

Cognate Transfer Courses (6 Hours).

Cognate	***Title***	***Hours***	***Semester***	***Grade***
Course #1				
Course #2				

Electives (9 Hours).

Elective Number	***Title***	***Hours***	***Semester***	***Grade***
Mentorship and Dissertation		***Hours***	***Semester***	***Grade***
SPT 798 Doctoral Mentorship		6		
SPT 799 Dissertation		12		
Portfolio	***Credit Hours***	***Hours***	***Semester***	***Grade***
SPT PRTD Doctoral Portfolio	0	0		

Table 4.2. Textbook and Publisher Information

Core Courses

SAR 710 Advanced Exercise Physiology and Scientific Principles	Exercise Physiology (7th Ed.)	Lippincott Williams & Wilkins	9780781797818	9781609138479
SAR 720 Advanced Strength and Conditioning	Designing Resistance Training Programs (3rd Ed.)	Human Kinetics	9780736042574	N/A
SAR 730 Advanced Exercise Testing and Prescription	Advanced Fitness Assessment and Exercise Prescription (7th Ed.)	Human Kinetics	9781450466004	9781450481021
SAR 740 Cardiovascular Physiology	Advanced Cardiovascular Exercise Physiology	Human Kinetics	9780736073929	9780736091619
SAR 745 Muscle Physiology	Skeletal Muscle	Human Kinetics	9780736045179	N/A
SAR 750 Exercise Endocrinology	Advanced Exercise Endocrinology	Human Kinetics	9780736075169	9781450436663
SAR 755 Exercise Metabolism	Exercise Metabolism	Human Kinetics	9780736041034	N/A
SAR 760 Environmental Exercise Physiology	Advanced Environmental Exercise Physiology	Human Kinetics	9780736074681	9780736085496
SAR 770 Exercise Epidemiology	Physical Activity Epidemiology	Human Kinetics	9781450424790	9781450433860
SAR 780 Advanced Sports Nutrition	Sports Nutrition & Performance Enhancing Supplements	Linus Learning	1-60797-339-1	N/A

Elective Courses

SAR 715 Contemporary Issues in Health and Fitness	N/A	N/A	N/A	N/A
SAR 725 Biomechanics of Exercise	Biomechanical Analysis of Fundamental Human Movements	Human Kinetics	9780736064026	9780736089371

Research Question 7:

Which textbooks were selected for each of the required courses? Table 4.2 provides a complete listing of the required textbooks for each of the proposed courses.

Research Question 8:

How were these textbooks selected? Once all of the proposed courses were identified, the researcher conducted an extensive online review of textbooks from multiple publishers for each of the selected courses. The researcher also solicited the input from several of the resident and distance learning faculty at USSA for their recommendations in terms of textbook selection.

Research Question 9:

Does the program allow for an accelerated degree program option? The proposed program of study also offers an accelerated degree program, which allows students who have successfully completed their bachelor's degree to obtain their doctoral degree through 90 additional semester hours.

Prior to developing the proposed accelerated degree program, the researcher contacted each university offering a resident doctoral program in Exercise Science/Physiology (i.e., BYU, FSU, OU, UofU) to see if any of them offered an accelerated degree program. Of the four programs reviewed, only FSU offered an accelerated degree program (aka "by-pass option"). To be eligible for the by-pass option, FSU students had to formally apply and meet the following criteria. First, students must have successfully completed the first year of the Master's of Science (MS) program with at least a 3.8 GPA. Second, students must have acquired substantial research experience at both undergraduate level and first year of MS program. Third, prior to taking the

preliminary doctoral examination, students must submit an article for publication as the primary author. Additionally, students must receive a letter of endorsement from the entire MS committee. Finally, submit a copy of their departmental folder to include: complete undergraduate record (to include GPA); complete graduate record (to include GPA); GRE scores, all letters of recommendation from initial admission to FSU; and an updated Curriculum Vitae (CV).

If accepted, formal admission is made through the Office of Graduate Admissions and a new program of study and doctoral supervisory committee is assigned (FSU, 2013).

The researcher also reviewed the accelerated degree program currently offered by USSA for an EdD in Sports Management. After thoroughly reviewing both accelerated degree programs, the researcher opted to use USSA's program as a template in developing a proposed EdD in Applied Exercise Science accelerated degree program. A copy of the proposed accelerated degree program of study is provided in Table 4.3.

Table 4.3. Bachelor of Sport Science to Doctor of Education in Applied Exercise Science Accelerated Degree Program of Study (90 Semester Hours)

M.S.S. Core Courses	*Credit Hours*	*Hours*	*Semester*	*Grade*
SAR 520 Exercise Physiology	3			
SAR 525 Sports Strength and Conditioning	3			
SAR 580 Exercise Testing and Prescription	3			

Applied Exercise Science Major Courses	*Credit Hours*	*Hours*	*Semester*	*Grade*
SAR 510 Sports Biomechanics	3			
SAR 511 Sports Performance Enhancement	3			
SAD 546 Seminar in Sports Medicine	3			
SAD 556 Issues in Nutrition and Health	3			
SAD 562 Scientific Principles of Resistance Training	3			

Doctoral Applied Exercise Science Core	*Credit Hours*	*Hours*	*Semester*	*Grade*
SAR 710 Advanced Exercise Physiology	3			
SAR 720 Advanced Strength & Conditioning	3			
SAR 730 Advanced Exercise Testing and Prescription	3			
SAR 760 Environmental Exercise Physiology	3			
SAR 770 Exercise Epidemiology	3			
SAR 780 Advanced Sports Nutrition	3			
Doctoral Research Core	*Credit Hours*	*Hours*	*Semester*	*Grade*
SAR 674 Research Statistics in Sport	3			
SAR 776 Research Methodologies	3			
SAR 790 Selected Readings in Sport	3			
Area of Specialization (6 Hours). Select one area.	*Credit Hours*	*Hours*	*Semester*	*Grade*
Human Anatomy & Physiology (select both courses)				
SAR 740 Cardiovascular Physiology	3			
SAR 745 Muscle Physiology	3			
Exercise Biochemistry (select both courses)				
SAR 750 Exercise Endocrinology	3			
SAR 755 Exercise Metabolism	3			

Cognate Transfer Courses (6 Hours).

Cognate	*Title*	*Hours*	*Semester*	*Grade*
Course #1				
Course #2				

Electives (9 Hours).

Elective Number	*Title*	*Hours*	*Semester*	*Grade*
Mentorship and Dissertation		*Hours*	*Semester*	*Grade*
SPT 798 Doctoral Mentorship		6		
SPT 799 Dissertation		12		
Portfolio	*Credit Hours*	*Hours*	*Semester*	*Grade*
SPT PRTD Doctoral Portfolio	0	0		

CHAPTER V

CONCLUSIONS, DISCUSSIONS AND RECOMMENDATIONS

The purpose of this study was twofold. First, conduct a thorough review of student handbooks and the programs of study, both at the master's and doctoral level, from several different universities currently offering advanced degrees in Exercise Science/Physiology. Second, develop a proposed program of study for an online doctoral program (EdD) in Applied Exercise Science.

The researcher began by conducting an extensive web search of different degree programs in Exercise Science/Physiology, at both the master's and doctoral level, from various resident and online universities in an attempt to develop an online doctoral degree program in Applied Exercise Science. The student handbooks and programs of study from the following universities with a resident master's and doctoral program in Exercise Science/Physiology were selected and reviewed: BYU, FSU, OU, and UofU. The programs of study from the following universities with an online master's program in Exercise Science/Physiology were selected and reviewed: Cal U, Concordia University - Chicago, and ATSU.

The research questions were: (1) Which terminal doctoral degree (PhD or EdD) is appropriate for the proposed program of study?; (2) What is the target audience for the proposed degree program?; (3) Which universities were selected for the program of study review?; (4) How were these universities selected?; (5) Which courses were selected for the proposed program of study?; (6) How were these courses selected?; (7) Which textbooks were selected for each of the required courses?; (8) How were these textbooks selected?; and (9) Does the program allow for an accelerated degree program option?

The researcher used USSA's current 66 semester hour online EdD in Sports Management program as a template to develop a similar degree program in Applied Exercise Science. Additionally, the researcher assigned textbooks and developed reading assignments, discussion questions, and class paper requirements for each of the proposed courses.

In addition to reviewing current Exercise Science/Physiology degree programs and developing a proposed online program in Applied Exercise Science, the research also provides the following benefits: First, it affords individuals interested in pursuing a doctoral degree in the field of Exercise Science but have previously been unable to do so with a possible means of achieving their academic goals. Second, it affords USSA with an opportunity for increased growth in both student enrollment and the number of doctoral degree programs offered.

This chapter presents the conclusions and discussions based on the results in Chapter IV and answers the research questions. Finally, recommendations are proposed for the students, instructors, and USSA as well as program implementation.

Conclusions

Within the limits of this research the following conclusions were developed:

1. It is possible to develop and implement an online doctoral program in Applied Exercise Science.
2. The USSA's current EdD in Sports Management program serves as an effective template for a similar program in Applied Exercise Science.
3. Students will need to participate in a Directed Individual Study or Mentorship, under the guidance and expertise of a qualified instructor/mentor, in order to be exposed to and practice some of the critical competencies specific to the

field of Exercise Science (e.g., how to perform skinfold/circumference measurements, administer VO_{2max} testing via open-circuit indirect calorimetry, or use a Vertec to assess vertical jump performance).

An extensive review of the different programs of study was used to answer the nine research questions posed in this study.

Research Question 1:

Which terminal doctoral degree (PhD or EdD) was selected for the proposed program of study? The researcher opted to pursue an EdD degree instead of a PhD for the following reasons: 1) the USSA EdD in Sports Management degree program was used as a template in developing the proposed program of study in Applied Exercise Science; and 2) USSA only has accreditation, through the Southern Association of Colleges and Schools Commission on Colleges, to provide EdD degrees.

Research Question 2:

Who is the target audience for the proposed degree program? The proposed degree program is tailored to and intended for potential students interested in pursuing an online doctoral degree in Applied Exercise Science.

The researcher used the same classification and degree concentration as the Kinesiology and Applied Physiology master's program at Rutgers University in determining the target audience for the proposed degree program. Specifically, the Kinesiology and Applied Physiology option requires three less labs and nine additional electives as compared to the Exercise Science and Exercise Physiology options.

Research Question 3:

Which universities were selected for the program of study review? The programs of study and student handbooks used in this study were from the following four universities: BYU, FSU, OU, and UofU. Additionally, the programs of study were evaluated from the following three universities offering online programs in Exercise Science/Physiology: Cal U, Concordia University - Chicago, and ATSU.

Research Question 4:

How were these universities selected? The researcher conducted an extensive online search to identify universities that currently offered masters and doctoral degree programs in Exercise Science/Physiology. From those, the researcher selected the following four resident programs: BYU, FSU, OU, and UofU. Additionally, the researcher selected the following three online programs: Cal U, Concordia University - Chicago, and ATSU. These universities were selected because all of the courses offered were in line with the purpose and scope of the proposed program of study yet provided a wide selection of options for both the general core and electives.

Research Question 5:

Which courses were selected for the proposed program of study? Table 4.1 provides a complete listing of the courses for the proposed program of study for an EdD in Applied Exercise Science. Appendix B provides the proposed course descriptions for the general core courses. Appendix C provides the proposed course descriptions for the elective courses. Appendix D provides the proposed course modules for the general core courses. Appendix E provides the proposed course modules for the elective courses. Appendix F provides the program description for an EdD in Applied Exercise Science.

Research Question 6:

How were these courses selected? The researcher conducted a thorough review of literature and the programs of study/student handbooks from various resident and online universities in an attempt to identify which courses were most common and best suited for an online doctoral degree program in Applied Exercise Science.

Research Question 7:

Which textbooks were selected for each of the required courses? Table 4.2 provides a complete listing of the textbooks selected for each course within the proposed program of study.

Research Question 8:

How were these textbooks selected? The researcher conducted an extensive online review of textbooks from multiple publishers for each of the selected courses. The researcher also solicited input from several of the resident and distance learning faculty at USSA for their recommendations in terms of textbook selection.

Research Question 9:

Does the program allow for an accelerated degree program option? The proposed program of study also allows for an accelerated degree program, which affords students who have successfully completed their bachelor's degree to obtain their doctoral degree through 90 additional semester hours. Table 4.3 provides the EdD in Applied Exercise Science accelerated degree program of study. Appendix G provides the proposed course descriptions for the accelerated degree program courses. Additionally, Appendix H is the EdD in Applied Exercise Science program of study for emphasis courses.

Discussion

Research has shown that online learning has continued to grow in popularity and is an effective means of pursuing higher education. Over 90% of the public four-year institutions and 50% of private institutions now offer online learning with nearly five million students reported to have taken at least one online course (Nof & Hill, 2005; Wang & Chen, 2011). Current research now suggests that advances in online learning have essentially closed the gap between the early versions of distance learning and that of traditional classroom instruction. In fact, several recent studies have reported "no significant difference" between the two. Other studies suggest that online learning may produce a more effective learning environment than traditional classroom instruction. For example, Wang and Chen (2011) suggest that online learning minimizes several of the instructional limitations imposed by traditional classroom instruction. Sparrow (2004) advocates that online learning has evolved the virtual classroom from a teacher-centered to a learner-centered environment. In other words, online learning provides the opportunity for instructors to be architects of their learning environment and grants them more instructional freedom and flexibility. Additionally, Russell (2002) proposes that online learning may improve learning effectiveness by allowing students to spend more time on task. Other potential benefits of online learning include: accessibility, flexibility, ease of use, independence, and cost (Zaitun & Siow, 2009; Welker & Berardino, 2005).

Despite the well-documented benefits of online learning, Park (2011) argues that some academic disciplines, especially those that require substantial hands-on experience to be proficient (e.g., art and design), may not be suitable for an online doctoral program. According to

Park, current online pedagogy methods are insufficient in teaching and preparing students for some of the critical competencies required for specific disciplines. However, Nova Southeastern University (NSU) recently instituted an online doctoral program in Physical Therapy with great success (Nof & Hill, 2005). The success of NSU's program suggests that the implementation of new pedagogy methods in the online environment can allow for greater student interactivity and achievement of desired learning objectives even in skill-based disciplines such as Physical Therapy or Exercise Science. This sentiment is echoed by Kim and Bonk (2006) who argue that the most critical skill for online instructors to possess, even more than effective teaching ability, is the ability to design and develop a quality online course.

Recommendations

The researcher provides the following recommendations for potential students and instructors of an online doctoral degree in Applied Exercise Science. Additionally, recommendations are also provided to USSA for implementation considerations.

Recommendations for Students. Students interested in pursuing an online doctoral degree in Applied Exercise Science should be aware of and willing to assume a greater level of responsibility for their education. Although online learning offers several advantages over traditional classroom instruction, it does not mean that online learning is a simpler pedagogy method in which to achieve student learning. Instead, students are required to take a more disciplined role in their educational experience. This includes proactive interaction with instructors and fellow students and as well as sustained independent study (Association to Advance Collegiate Schools of Business, 2007).

Recommendations for Instructors. The role of an online instructor is different from that of traditional classroom instructor. Similarly, the instructor/student relationship is also

different. Therefore, online instructors should acknowledge and embrace these differences. Online instructors should view students as active learners instead of passive learners and themselves as facilitators/co-investigators instead of teachers (Abras et al., 2003; Reason, 1994; Selener, 1997).

Research also suggests some possible disadvantages with online learning. Some potential disadvantages include the lack of interaction between the instructor and other students and increased workload (Kuriloff, 2005). In order to compensate for these reduced social interactions, online instructors need to promote group collaboration and teaching presence. Improved group collaboration can be achieved by requiring students to periodically work together on discussion questions and generate a group response.

Instructors should be aware of the physical separation between them and their students as a result of online learning and compensate by enacting a proactive teaching presence. Online instructors should contact each student upon enrollment by email/phone and make themselves available by offering regular online office hours. Additionally, instructors should strive to provide feedback within 24 to 48 hours to all student submissions, questions, and concerns (Creasman, 2012).

Online instructors should be mindful of the amount of reading and coursework they assign. Research suggests that the structure and rigors of online learning may be harder than traditional classroom instruction for some students and as a result make it more likely that they fail or drop out (Imran et al., 2012). The course materials used should be manageable in length so to effectively introduce the desired concepts but not too lengthy that the amount of required reading overwhelms students. Additionally, online instructors should provide students with examples for assignments. This helps to reduce the

extraneous load imposed on students through demonstration thereby allowing students to better focus their cognitive resources on learning the material (Darabi & Jin, 2013).

Recommendations for USSA. As previously discussed, online programs provide significant advantages to the institutions offering them. For example, offering online learning generally increases both the scope and scale of the school's academic programs as well as fundamentally changes the way institutions compete for students (AACSB, 2007). Additionally, institutions with online programs offer an enhanced educational experience to their students by employing adjunct faculty from all over the country, and possibly the world, who are experts within their field of study (Nof & Hill, 2005).

Research suggests that in order for online learning to be effective it must be comprised of the following three elements: cognitive presence (i.e., extent to which students are able to negotiate and construct knowledge through sustained and meaningful discourse); social presence (i.e., the extent to which students feel connected to the learning environment); and teaching presence (i.e., the extent to which the teacher is involved in supporting and facilitating student learning) (Wang & Chen, 2011; Garrison et al., 2000). Similarly, Swan (2003) recommends the following three kinds of student interactivity for effective online learning: interaction with content, interaction with instructors, and interaction with peers.

Finally, Prineas and Cini (2011) and Kumar and Dawson (2012) recommend that institutions be conscious with the sequence and structuring of courses to ensure subsequent courses build upon preceding ones.

Recommendations for Implementation/Future Research. The researcher provides the following recommendations for future research.

First, the courseware used in online courses should be frequently reviewed to ensure currency and relevance. For example, SAR 720 Advanced Strength and Conditioning uses the third edition of its primary text (i.e., Designing Resistance Training Programs) despite the fact that the fourth edition is currently available.

Second, to compensate for the lack of hands-on/practical experience normally afforded to students participating in traditional classroom instruction, pertinent video clips/web links should be researched or developed and incorporated into certain online courses to better introduce some of the different competencies and skills specific to the field of Exercise Science/Physiology (e.g., how to perform skinfold/circumference measurements, administer VO_{2max} testing via open-circuit indirect calorimetry, or use a Vertec to assess vertical jump performance). For example, the proposed textbook for SAR 730 Advanced Exercise Testing and Prescription (Advanced Fitness Assessment and Exercise Prescription (7^{th} Ed.)) includes access to 44 different video clips, equating to over 75 minutes of additional course content and is cross-referenced to relevant content in the text, to demonstrate various exercise assessments, procedures, and common errors.

Third, the feasibility and practicality of a portable exercise testing and assessment lab kit that could be developed and made available to students should be considered. This would afford students the ability to learn and practice several of the critical competencies specific to an advanced degree in Exercise Science/Physiology via an online environment. The researcher polled nine different collegiate professors (PhDs) of graduate level Exercise Science/Physiology from various universities (i.e., Ball State University, FSU, Georgia State University, Northern Arizona University, University of

Alabama, University of Memphis, U.S. Naval Academy, and the USSA) for input on such a kit. Two of the nine responded that such a kit is not necessary since most bachelor's and master's programs in Exercise Science/Physiology provide sufficient exposure and training to said competencies. However, the other seven supported the recommendation and provided input. Table 5.1 provides a listing of the recommended items as well as vendor information, part numbers (P/N), and procurement costs. The following items were recommended but not included in the proposed lab kit: stopwatch, fiberglass measuring tape (e.g., measure standing long jump and overhead basketball/medicine ball throw distance), glucometer, metronome, and accelerometer. The researcher opted not to include these items due to their limited use/applicability (e.g., glucometer and metronome) or because students may already have access to or could purchase these items on their own (e.g., stopwatch and fiberglass measuring tape).

Table 5.1. Exercise Testing Lab Kit Components

Slim Guide Skinfold Calipers	Power-Systems Inc.	85350	$24.95
Gulick Tape	Power-Systems Inc.	85415	$30.95
Digital Blood Pressure Monitor	Power-Systems Inc.	85402	$99.95
Heart Rate Monitor	Power-Systems Inc.	91936	$149.95
Lactate Plus Individual Package *	Lactate.com	-	$370
Total Cost = $675.80			
* Package includes Lactate Plus Analyzer, 50 test strips, lancet device, 100 lancets, and Secrets of Lactate CD.			

Finally, consideration should be given to require future students to complete SPT 798 Doctoral Mentorship, SPT 797 Directed Individualized Study, or both. If implemented, each course should be specifically structured to allow for a sufficient amount of hands-on and practical exposure/experience to the critical competencies pertinent to an advanced degree in

Exercise Science/Physiology. Said courses could be taken locally at USSA or at another institution that offers graduate level Exercise Science/Physiology degree programs.

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APPENDICES

Appendix A. Doctor of Education in Sports Management
Program of Study
66 Semester Hours

General Applied Exercise Science Core	*Credit Hours*	*Hours*	*Semester*	*Grade*
SAB 661 Contemporary Issues in Sports	3			
SAM 660 Financial Aspects in Sport	3			
SAB 634 Ethics in Sports	3			
SAB 768 Psychology of Human Behavior	3			
SAM 730 Sport Leadership Principles	3			
SAM 786 Legal Aspects of Sport	3			
Doctoral Research Core	*Credit Hours*	*Hours*	*Semester*	*Grade*
SAR 674 Research Statistics in Sport	3			
SAR 776 Research Methodologies	3			
SAR 790 Selected Readings in Sport	3			

Area of Specialization (6 Hours). Select one area.	*Credit Hours*	*Hours*	*Semester*	*Grade*
Leadership in Sports (select two of the following courses)				
SAM 735 Strategic Planning for Sports Organizations	3			
SAM 736 Communications for Leadership	3			
SAM 737 Leadership: Theory and Practice	3			
Sports Marketing (select both courses)				
SAM 644 Sports Marketing Research	3			
SAM 622 Sports Entrepreneurship	3			
Human Resource Management in Sports (select both courses)				
SAM 640 Labor Relations in Sports	3			
SAM 672 Personnel Training and Development	3			

COGNATE TRANSFER COURSES (6 HOURS).

Cognate	*Title*	*Hours*	*Semester*	*Grade*
Course #1				
Course #2				

ELECTIVES (9 HOURS).

Elective Number	*Title*	*Hours*	*Semester*	*Grade*

Mentorship and Dissertation	*Hours*	*Semester*	*Grade*
SPT 798 Doctoral Mentorship	6		
SPT 799 Dissertation	12		

Portfolio	*Credit Hours*	*Hours*	*Semester*	*Grade*
SPT PRTD Doctoral Portfolio	0	0		

Appendix B. Core Course Descriptions

SAR 710 Advanced Exercise Physiology and Scientific Principles in Fitness and Health (3 sem. hrs.)

This course is designed to develop a comprehensive understanding of exercise physiology and the scientific principles used to evaluate physiological components. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include nutrition, bioenergetics, cardiorespiratory physiology, neuromuscular physiology, and endocrinology. Prerequisite: Masters Level Exercise Physiology. This class requires a class paper.

SAR 720 Advanced Strength and Conditioning (3 sem. hrs.)

The focus of this course is to develop a comprehensive understanding of the physiological principles, mechanisms, and program design necessary to plan, evaluate, and modify exercise programs. Particular attention will be given to periodization techniques. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include speed, power, strength, hypertrophy, agility, bioenergetics, program design, and periodization techniques. Prerequisite: Advanced Exercise Physiology and Scientific Principles in Fitness and Health. This class requires a class paper.

SAR 730 Advanced Exercise Testing and Prescription (3 sem. hrs.)

This course is designed to develop a comprehensive understanding of exercise testing and prescription. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness

industry. Topics include preliminary health screening and risk classification, cardiovascular testing and program design, muscular strength and endurance testing and program design, body composition testing and program design, flexibility testing and program design, and balance testing and program design. Prerequisite: Masters Level Exercise Testing and Prescription. This class requires a class paper.

SAR 740 Cardiovascular Physiology (3 sem. hrs.)

This course is designed to develop a comprehensive understanding of the cardiovascular system and the adaptations associated with exercise. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include components of the cardiovascular system, anatomy and function of the heart, conduction system of the heart, electrocardiogram interpretation, hemodynamics and peripheral circulation, cardiovascular responses and adaptations to aerobic exercise, and cardiovascular responses and adaptations to resistance exercise. Prerequisite: Advanced Exercise Physiology and Scientific Principles in Fitness and Health. This class requires a class paper.

SAR 745 Muscle Physiology (3 sem. hrs.)

This course is designed to develop a comprehensive understanding of the different facets of muscle physiology. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include muscle architecture and muscle fiber anatomy, ion channels, pumps, binding proteins, resting and action potentials, muscle contraction, muscle metabolism, fatigue, disuse, muscle training, injury and repair, and aging. Prerequisite:

Advanced Exercise Physiology and Scientific Principles in Fitness and Health. This class requires a class paper.

SAR 750 Exercise Endocrinology (3 sem. hrs.)

This course is designed to develop a comprehensive understanding of the relationship between physical activity, hormone function, and health. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include an introduction to the endocrine system, nonhormonal signaling, autonomic nervous system (ANS) and hormonal control of cardiorespiratory function, body fluid balance, hormonal control of fuel utilization and energy expenditure / intake, effects of exercise on reproductive hormones, effects of systemic hormones on endurance and resistance training adaptations, exercise and endocrine rhythms, and recommendations for measuring hormone concentrations, synthesis, and rate of secretion. Prerequisite: Advanced Exercise Physiology and Scientific Principles in Fitness and Health. This class requires a class paper.

SAR 755 Exercise Metabolism (3 sem. hrs.)

This course is designed to develop a comprehensive understanding of the regulation of various metabolic processes during exercise. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include anaerobic metabolism, lactate transport and transporters, carbohydrate metabolism during exercise, adipose tissue and skeletal muscle lipid metabolism during exercise, effects of exercise on protein and amino acid metabolism, metabolic fatigue, and endurance training-induced

adaptations. Prerequisite: Advanced Exercise Physiology and Scientific Principles in Fitness and Health. This class requires a class paper.

SAR 760 Environmental Exercise Physiology (3 sem. hrs.)

This course is designed to develop a comprehensive understanding of the key concepts and current debates in the field of environmental exercise physiology. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include introduction to environmental exercise physiology, physiological responses to exercising in hot environments, physiological responses to exercising in the cold, physiological responses to a hyperbaric environment (diving), recommendations for exercising at altitude, and chronobiological rhythms and exercise performance. This class requires a class paper.

SAR 770 Exercise Epidemiology (3 sem. hrs.)

This course is designed to develop a comprehensive understanding of exercise epidemiology and the role that physical inactivity plays in injury, disease, and mortality. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include physical activity and disease mortality, physical activity and risk factors, physical activity and chronic diseases, and physical activity and mental health. This class requires a class paper.

SAR 780 Advanced Sports Nutrition (3 sem. hrs.)

This course is designed to develop a comprehensive understanding of complex interaction between nutrition, supplements, and sports performance. Through selected readings, past and current research will be evaluated and considered for future research

and application in the health and fitness industry. Topics include introduction to the three systems required to produce energy, recommendations for protein consumption, recommendations for carbohydrate consumption, recommendations for dietary fat consumption, nutrient timing, dietary strategies, functional foods and nutraceuticals, and ergogenic sports supplements. Prerequisite: Masters Level Nutrition. This class requires a class paper.

SPT 798 Doctoral Mentorship (6 sem. hrs.)

The EdD mentorship program in applied exercise science allows students to perform on-the-job training and gain real-world experience at a university or organization in order to prepare them for their desired future careers. The Academy has certain requirements that mentors must meet to ensure students are taught by knowledgeable and experienced persons.

Prerequisites for the Mentorship

1. Student submits required forms (Appendix A, mentor resume, learning objectives)
2. The mentor's resume must list the highest degree attained. **
3. Mentorship learning objectives and duties (which student and proposed mentor put together). Student must have a minimum of five objectives and the mentor must initial each one. Student can have as many as he/she feels can be accomplished, and they must be formatted like the example in the handbook. Learning Objectives should encompass a task from each course in the student's program of study, if possible.
4. If mentor meets criteria, mentorship advisor is assigned to review learning

objectives.

5. Student's file is submitted to Dean for Academic Affairs for approval.
6. Once approved, student is notified that he/she can now register online & pay mentorship fees.
7. Once officially registered, student then starts accruing hours.

** If mentor does not have the required graduate degree, but has enough experience, student can request an exception by providing justification for his/her selection of mentor.

Guidelines for Writing Learning Objectives

- Learning objectives should be formatted as in the Mentorship Handbook, i.e. each objective should list the objective, measurement tool, and expected outcome.
- Learning objectives must be written in an active tense as opposed to a passive tense, i.e., performing a tangible task instead of an intangible or immeasurable task.
- There is a minimum requirement of five learning objectives. Ideally, (but this is not always possible) the learning objectives should encompass a task from each course in the student's program of study.

Mentorship Procedures

- Each student must submit a brief monthly report summarizing mentorship activities and listing the number of hours accrued for that month. These monthly reports represent 30% of the student's grade.
- Mentor must submit a brief monthly evaluation of the student's progress and attest to the hours worked.

- After the required hours are completed, student will write a comprehensive paper in APA format about the experience. This paper represents 30% of the grade.
- The Mentor completes a final comprehensive evaluation of the student's performance. This evaluation represents 30% of the student's grade.
- The Mentorship Advisor conducts an oral interview with the student via phone. This interview represents 10% of the student's grade.
- At some point during the mentorship, the student must submit a photo of him/herself and the mentor together. Some type of action photo is preferred.

The four grades mentioned above are added together for the final grade. However, grades are recorded as pass/fail.Student must complete the end-of-course survey. Failure to complete survey results in the grade being withheld until the survey is completed.

Guidelines for Writing the Final Mentorship Paper

- The paper should be approximately 12-20 pages in length, formatted according to APA rules.
- Correct spelling, formatting, and grammar usage are expected.
- The student must provide details of how each learning objective was achieved, or if a learning objective was not achieved, an explanation of why not.
- The student must provide an analysis of whether the mentorship prepared him/her for future employment and if so, how.

Appendix C. Elective Course Descriptions

SAR 715 Contemporary Issues in Health and Fitness (3 sem. hrs.)

The health and fitness industry is dynamic. Constantly new research is changing the way we think about health and fitness programs and design. Through selected readings, current "hot topics" in the health and fitness industry will be evaluated. Topics include nutritional, exercise physiology, strength and conditioning, cardiorespiratory fitness, and body composition. Prerequisite: Masters Level Exercise Physiology. This class requires a class paper.

SAR 725 Biomechanics of Exercise (3 sem. hrs.)

This course is designed to develop a comprehensive understanding of the biomechanics of human movement. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include the biomechanics of standing, toppling, slipping, falling, landing, walking, running, jumping, gripping, pushing, pulling, lifting, lowering, carrying, throwing, striking, catching, climbing, swinging, and various airborne maneuvers (e.g., grand jeté in ballet). This class requires a class paper.

SPT 797 Directed Individualized Study (3-6 sem. hrs.)

Individualized study is directed by a qualified graduate or National Faculty member in a specific interest area. It is designed to provide flexible alternatives, and it is personalized to the individual student. This course may involve scholarly research, data collection and reporting, preparation of educational materials, or the design and application of policy and programs pertaining to the field of exercise physiology. It requires the permission of the Director of Doctoral Studies prior to registration.

Appendix D. Core Course Modules

SAR 710 Advanced Exercise Physiology and Scientific Principles

Course Description

This course is designed to develop a comprehensive understanding of exercise physiology and the scientific principles used to evaluate physiological components. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include nutrition, bioenergetics, cardiorespiratory physiology, neuromuscular physiology, and endocrinology.

Required Textbook

There are no required textbooks for this course. Students will review and interpret scholarly peer-reviewed articles in the topics of nutrition, bioenergetics, cardiorespiratory physiology, neuromuscular physiology, and endocrinology. Some of these articles will be provided to the students.

Suggested Supplemental Textbook

The following textbook is designed to assist students with general concepts and complement the assigned articles:

Katch, V. L. (2009). Exercise physiology (7th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Course Goals

The purpose of this course is to get students to read past the basics and look deeper into topics in exercise physiology. Students will interpret the research articles and

write brief reviews that discuss their findings and discuss what appears to be the most logical answer and what future research should be conducted to answer the unknown.

Upon completion of this course, the student will have:

- Reviewed and interpreted articles in the field of exercise physiology
- Written brief reviews of exercise physiology topics
- Composed a complete review of literature pertaining to one of the topics with an emphasis of their choice (approved by the instructor)

Course Assignments

Brief reviews for each topic should consist of:

- APA in-text citations and appropriate bibliography
- Title Page
- Introduction to the topic
- Brief background and findings of previous literature
- Results of current literature (focus on the articles assigned to the class)
- Discussion of the results including how and why they differ
- Conclusions of what is currently accepted based on this literature and include your ideas for future research and what you think should be accepted
- Complete bibliography including the articles assigned and other supporting literature

Students must demonstrate critical thinking and appropriate interpretation of the data and research presented in the articles. Direct quotes are acceptable but should be limited and should only be used to support a conclusion drawn from the student's opinion.

Each brief review article should not exceed eight pages and should be formatted following APA standard guidelines (double-spaced, 12-point Times New Roman).

Submit your assignment as a Word file (with a .doc extension). Be sure to properly name your file similar to this: smith_ja_sar710_review1, where "smith_ja" is your last name and two initials. Use underscores (Shift Minus) to separate the components of the file name.

Review I Reading Assignment

Nutrition

- Am J Physiol Endocrinol Metab. 2007 Jul;293(1):E197-202. Epub 2007 Mar 27.Calorie restriction or exercise: effects on coronary heart disease risk factors. A randomized, controlled trial. Fontana L, Villareal DT, Weiss EP, Racette SB, Steger-May K, Klein S, Holloszy JO; and the Washington University School of Medicine CALERIE Group.http://www.ncbi.nlm.nih.gov/pubmed/17389710
- Arch Intern Med. 2006 Feb 13;166(3):285-93.Effects of low-carbohydrate vs low-fat diets on weight loss and cardiovascular risk factors: a meta-analysis of randomized controlled trials. Nordmann AJ, Nordmann A, Briel M, Keller U, Yancy WS Jr, Brehm BJ, Bucher HC. http://www.ncbi.nlm.nih.gov/pubmed/16476868
- Nutr J. 2004 Jul 28;3:9."A calorie is a calorie" violates the second law of thermodynamics. Feinman RD, Fine EJ. http://www.ncbi.nlm.nih.gov/pubmed/15282028
- Int J Obes (Lond). 2006 Feb;30(2):342-9.Long-term effects of popular dietary approaches on weight loss and features of insulin resistance. McAuley KA, Smith KJ, Taylor RW, McLay RT, Williams SM, Mann JI. http://www.ncbi.nlm.nih.gov/pubmed/16158081

- Curr Opin Clin Nutr Metab Care. 1999 Nov;2(6):521-6.Dietary fat and physical performance. Jeukendrup AE. http://www.ncbi.nlm.nih.gov/pubmed/10678683
- J Nutr. 2006 Feb;136(2):533S-537S.Leucine regulates translation initiation of protein synthesis in skeletal muscle after exercise. Norton LE, Layman DK. http://www.ncbi.nlm.nih.gov/pubmed/16424142
- Int J Sport Nutr Exerc Metab. 2003 Sep;13(3):382-95.Effect of a carbohydrate-protein supplement on endurance performance during exercise of varying intensity. Ivy JL, Res PT, Sprague RC, Widzer MO. http://www.ncbi.nlm.nih.gov/pubmed/14669937
- Am J Clin Nutr. 2007 Aug;86(2):451-6.Aging does not impair the anabolic response to a protein-rich meal. Symons TB, Schutzler SE, Cocke TL, Chinkes DL, Wolfe RR, Paddon-Jones D. http://www.ncbi.nlm.nih.gov/pubmed/17684218
- Am J Clin Nutr. 1998 Mar;67(3):397-404.Effect of medium-chain triacylglycerol and carbohydrate ingestion during exercise on substrate utilization and subsequent cycling performance. Jeukendrup AE, Thielen JJ, Wagenmakers AJ, Brouns F, Saris WH. http://www.ncbi.nlm.nih.gov/pubmed/9497182
- J Am Coll Nutr. 2000 Oct;19(5 Suppl):540S-548S.The impact of egg limitations on coronary heart disease risk: do the numbers add up? McNamara DJ. http://www.ncbi.nlm.nih.gov/pubmed/11023005
- Ann Intern Med. 2004 May 18;140(10):769-77.A low-carbohydrate, ketogenic diet versus a low-fat diet to treat obesity and hyperlipidemia: a randomized, controlled trial. Yancy WS Jr, Olsen MK, Guyton JR, Bakst RP, Westman EC. http://www.ncbi.nlm.nih.gov/pubmed/15148063

- Am J Clin Nutr. 2005 Jun;81(6):1298-306.Effect of an energy-restricted, high-protein, low-fat diet relative to a conventional high-carbohydrate, low-fat diet on weight loss, body composition, nutritional status, and markers of cardiovascular health in obese women. Noakes M, Keogh JB, Foster PR, Clifton PM. http://www.ncbi.nlm.nih.gov/pubmed/15941879

- Am J Clin Nutr. 2005 Apr;81(4):762-72.Carbohydrate-restricted diets high in either monounsaturated fat or protein are equally effective at promoting fat loss and improving blood lipids. Luscombe-Marsh ND, Noakes M, Wittert GA, Keogh JB, Foster P, Clifton PM. http://www.ncbi.nlm.nih.gov/pubmed/15817850

- J Strength Cond Res. 2009 Oct 7. [Epub ahead of print]Low-Calorie Energy Drink Improves Physiological Response to Exercise in Previously Sedentary Men: A Placebo-Controlled Efficacy and Safety Study. Lockwood CM, Moon JR, Smith AE, Tobkin SE, Kendall KL, Graef JL, Cramer JT, Stout JR. http://www.ncbi.nlm.nih.gov/pubmed/19816213

- Nutr Metab (Lond). 2008 Apr 21;5:11.Minimal nutrition intervention with high-protein/low-carbohydrate and low-fat, nutrient-dense food supplement improves body composition and exercise benefits in overweight adults: A randomized controlled trial. Lockwood CM, Moon JR, Tobkin SE, Walter AA, Smith AE, Dalbo VJ, Cramer JT, Stout JR. http://www.ncbi.nlm.nih.gov/pubmed/18426586

Review II Reading Assignment

Bioenergetics

- Am J Physiol Endocrinol Metab. 2007 Feb;292(2):E394-9. Epub 2006 Sep 19.Are blood flow and lipolysis in subcutaneous adipose tissue influenced by

contractions in adjacent muscles in humans? Stallknecht B, Dela F, Helge JW. http://www.ncbi.nlm.nih.gov/pubmed/16985258

- Eur J Appl Physiol. 2006 Nov;98(4):341-54. Epub 2006 Aug 11.Intramyocellular lipid stores increase markedly in athletes after 1.5 days lipid supplementation and are utilized during exercise in proportion to their content. Zehnder M, Christ ER, Ith M, Acheson KJ, Pouteau E, Kreis R, Trepp R, Diem P, Boesch C, Décombaz J. http://www.ncbi.nlm.nih.gov/pubmed/16902796
- Int J Sports Med. 1998 May;19(4):231-44.Fat metabolism during exercise: a review. Part I: fatty acid mobilization and muscle metabolism. Jeukendrup AE, Saris WH, Wagenmakers AJ. http://www.ncbi.nlm.nih.gov/pubmed/9657362
- Int J Sports Med. 1998 Jul;19(5):293-302.Fat metabolism during exercise: a review–part II: regulation of metabolism and the effects of training. Jeukendrup AE, Saris WH, Wagenmakers AJ. http://www.ncbi.nlm.nih.gov/pubmed/9721051
- Int J Sports Med. 1998 Aug;19(6):371-9.Fat metabolism during exercise: a review–part III: effects of nutritional interventions. Jeukendrup AE, Saris WH, Wagenmakers AJ. http://www.ncbi.nlm.nih.gov/pubmed/9774203
- Med Sci Sports Exerc. 2000 Apr;32(4):756-63.An enzymatic approach to lactate production in human skeletal muscle during exercise. Spriet LL, Howlett RA, Heigenhauser GJ. http://www.ncbi.nlm.nih.gov/pubmed/10776894
- Ann N Y Acad Sci. 2002 Jun;967:217-35.Regulation of fat metabolism in skeletal muscle. Jeukendrup AE. http://www.ncbi.nlm.nih.gov/pubmed/12079850

- Med Sci Sports Exerc. 2000 Apr;32(4):772-7.Quantitative assessment of pathways for lactate disposal in skeletal muscle fiber types. Donovan CM, Pagliassotti MJ. http://www.ncbi.nlm.nih.gov/pubmed/10776896

- Am J Physiol Endocrinol Metab. 2007 Jan;292(1):E107-16. Epub 2006 Aug 8.Contributions of working muscle to whole body lipid metabolism are altered by exercise intensity and training. Friedlander AL, Jacobs KA, Fattor JA, Horning MA, Hagobian TA, Bauer TA, Wolfel EE, Brooks GA. http://www.ncbi.nlm.nih.gov/pubmed/16896167

- Med Sci Sports Exerc. 2000 Apr;32(4):764-71.Muscle as a consumer of lactate. Gladden LB. http://www.ncbi.nlm.nih.gov/pubmed/10776895

- Pflugers Arch. 1987 Dec;410(6):652-6.Carbohydrate feeding and glycogen synthesis during exercise in man. Kuipers H, Keizer HA, Brouns F, Saris WH. http://www.ncbi.nlm.nih.gov/pubmed/3449801

- Med Sci Sports Exerc. 2000 Apr;32(4):790-9.Intra- and extra-cellular lactate shuttles. Brooks GA. http://www.ncbi.nlm.nih.gov/pubmed/10776898

Review III Reading Assignment

Cardiorespiratory Physiology

- Med Sci Sports Exerc. 1984;16(1):29-43.Metabolic bases of excess post-exercise oxygen consumption: a review. Gaesser GA, Brooks GA. http://www.ncbi.nlm.nih.gov/pubmed/6369064

- Ergonomics. 1988 Oct;31(10):1413-9.A comparison between methods of measuring anaerobic work capacity. Nebelsick-Gullett LJ, Housh TJ, Johnson GO, Bauge SM. http://www.ncbi.nlm.nih.gov/pubmed/3208733

- Res Q Exerc Sport. 1990 Dec;61(4):406-9.A methodological consideration for the determination of critical power and anaerobic work capacity. Housh DJ, Housh TJ, Bauge SM. http://www.ncbi.nlm.nih.gov/pubmed/2132901
- Med Sci Sports Exerc. 2010 Mar 25. [Epub ahead of print]Walking and Running Economy: Inverse Association with Peak Oxygen Uptake. Sawyer BJ, Blessinger JR, Irving BA, Weltman A, Patrie JT, Gaesser GA. http://www.ncbi.nlm.nih.gov/pubmed/20351592
- Med Sci Sports Exerc. 2010 Mar 25. [Epub ahead of print]Cardiorespiratory Fitness, Adiposity, and All-Cause Mortality in Women. Farrell SW, Fitzgerald SJ, McAuley P, Barlow CE. http://www.ncbi.nlm.nih.gov/pubmed/20351588
- Obesity (Silver Spring). 2007 Dec;15(12):3140-9.Cardiorespiratory fitness, different measures of adiposity, and cancer mortality in men. Farrell SW, Cortese GM, LaMonte MJ, Blair SN. http://www.ncbi.nlm.nih.gov/pubmed/18198325
- JAMA. 2007 Dec 5;298(21):2507-16.Cardiorespiratory fitness and adiposity as mortality predictors in older adults. Sui X, LaMonte MJ, Laditka JN, Hardin JW, Chase N, Hooker SP, Blair SN. http://www.ncbi.nlm.nih.gov/pubmed/18056904
- Phys Sportsmed. 2009 Dec;37(4):154-6.Exercise capacity: a crystal ball in forecasting future health outcomes? Franklin BA. http://www.ncbi.nlm.nih.gov/pubmed/20048553

Review IV Reading Assignment

Neuromuscular Physiology

- Eur J Appl Physiol Occup Physiol. 1998 Nov;78(6):555-9.Effect of fatigue on hamstring coactivation during isokinetic knee extensions. Weir JP, Keefe DA, Eaton JF, Augustine RT, Tobin DM. http://www.ncbi.nlm.nih.gov/pubmed/9840412
- Eur J Appl Physiol Occup Physiol. 1996;73(3-4):387-92.The effects of joint angle on electromyographic indices of fatigue. Weir JP, McDonough AL, Hill VJ. http://www.ncbi.nlm.nih.gov/pubmed/8781874
- Br J Sports Med. 2009 Oct;43(10):782-8. Epub 2008 Dec 3.Exercising with reserve: evidence that the central nervous system regulates prolonged exercise performance. Swart J, Lamberts RP, Lambert MI, St Clair Gibson A, Lambert EV, Skowno J, Noakes TD. http://www.ncbi.nlm.nih.gov/pubmed/19052141
- J Appl Physiol. 2008 May;104(5):1541-2. Epub 2008 Jan 31.Fatigue mechanisms determining exercise performance: integrative physiology is systems biology. Hargreaves M. http://www.ncbi.nlm.nih.gov/pubmed/18239081
- J Appl Physiol, May 1, 2008; 104 (5): 1543-1544.Viewpoint: Fatigue mechanisms determining exercise performance: integrative physiology is systems physiology. M. Amann, S. M. Marcora, L. Nybo, T. A. Duhamel, T. D. Noakes, V. Jaquinandi, J. L. Saumet, P. Abraham, B. T. Ameredes, M. Burnley, A. M. Jones, S. C. Gandevia, J. E. Butler and J. L. Taylor
- Br J Sports Med. 2004 Aug;38(4):511-4.From catastrophe to complexity: a novel model of integrative central neural regulation of effort and fatigue during exercise in humans. Noakes TD, St Clair Gibson A, Lambert EV. http://www.ncbi.nlm.nih.gov/pubmed/15273198

- Br J Sports Med. 2004 Oct;38(5):648-9.Logical limitations to the "catastrophe" models of fatigue during exercise in humans. Noakes TD, St Clair Gibson A. http://www.ncbi.nlm.nih.gov/pubmed/15388560
- Adv Physiol Educ. 2009 Dec;33(4):302-7.Is lactate production related to muscular fatigue? A pedagogical proposition using empirical facts. Macedo DV, Lazarim FL, Catanho da Silva FO, Tessuti LS, Hohl R. http://www.ncbi.nlm.nih.gov/pubmed/19948679
- Am J Physiol Regul Integr Comp Physiol. 2005 Sep;289(3):R902-3; author reply R904-910.Lactic acid still remains the real cause of exercise-induced metabolic acidosis. Böning D, Strobel G, Beneke R, Maassen N. http://www.ncbi.nlm.nih.gov/pubmed/16105825
- Am J Physiol Regul Integr Comp Physiol. 2005 Sep;289(3):R891-4; author reply R904-910.Applying physicochemical principles to skeletal muscle acid-base status. Lindinger MI, Kowalchuk JM, Heigenhauser GJ. http://www.ncbi.nlm.nih.gov/pubmed/16105823
- Am J Physiol Regul Integr Comp Physiol. 2004 Sep;287(3):R502-16.Biochemistry of exercise-induced metabolic acidosis. Robergs RA, Ghiasvand F, Parker D. http://www.ncbi.nlm.nih.gov/pubmed/15308499
- Br J Sports Med. 2006 Jul;40(7):573-86; discussion 586.Is fatigue all in your head? A critical review of the central governor model. Weir JP, Beck TW, Cramer JT, Housh TJ. http://www.ncbi.nlm.nih.gov/pubmed/16799110
- Am J Physiol Regul Integr Comp Physiol. 2006 Jul;291(1):R235-7; author reply R238-9.Explaining pH change in exercising muscle: lactic acid, proton

consumption, and buffering vs. strong ion difference. Kemp G, Böning D, Beneke R, Maassen N. http://www.ncbi.nlm.nih.gov/pubmed/16760335

- Am J Physiol Regul Integr Comp Physiol. 289:904-910, 2005. Lingering construct of lactic acidosis. Robert A. Robergs, Farzenah Ghiasvand and Daryl Parker. doi:10.1152/ajpregu.00117.2005
- Am J Physiol Regulatory Integrative Comp Physiol. 289:895-901, 2005. Graham Kemp. doi:10.1152/ajpregu.00641.2004
- J Appl Physiol. 105:361-362, 2008.Michael I. Lindinger (Rebuttal letters). doi:10.1152/japplphysiol.00162.2008c
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- J Appl Physiol 105:363-367, 2008.Comments on Point:Counterpoint"Lactic acid is/is not the only physicochemical contributor to the acidosis of exercise". Jones, William W. Stringer, Karlman Wasserman, Waldemar Moll, Gerolf Gros, E. S. Prakash, Robert A. Robergs, Benjamin F. Miller, L. Bruce Gladden, Norman David S. Rowlands, Kent Sahlin and Ralph Beneke. doi:10.1152/japplphysiol.zdg-8016-pcpcomm.2008
- J Appl Physiol.104:1543-1546, 2008.Commentaries on Viewpoint: Fatigue mechanisms determining exercise performance: Integrative physiology is systems physiology. Ameredes, Mark Burnley, Andrew M. Jones, Simon C. Gandevia, Jane E.

Butler David Noakes, Vincent Jaquinandi, Jean Louis Saumet, Pierre Abraham, Bill T. Markus Amann, Samuele M. Marcora, Lars Nybo, Todd A. Duhamel, Timothy and Janet L. Taylor. doi:10.1152/japplphysiol.90427.2008

Review V Reading Assignment

Endocrinology

- Growth Horm IGF Res. 2009 Aug;19(4):308-19. Epub 2009 Jun 7.The physiology of growth hormone and sport. Widdowson WM, Healy ML, Sönksen PH, Gibney J. http://www.ncbi.nlm.nih.gov/pubmed/19505835
- Endocr Rev. 2007 Oct;28(6):603-24. Epub 2007 Sep 4.The growth hormone/insulin-like growth factor-I axis in exercise and sport. Gibney J, Healy ML, Sönksen PH. http://www.ncbi.nlm.nih.gov/pubmed/17785429
- Growth Horm IGF Res. 2009 Aug;19(4):408-11. Epub 2009 May 24.IGF-I abuse in sport: current knowledge and future prospects for detection. Guha N, Sönksen PH, Holt RI. http://www.ncbi.nlm.nih.gov/pubmed/19467615
- Sports Med. 2010 Mar 1;40(3):207-27.The effect of the menstrual cycle on exercise metabolism: implications for exercise performance in eumenorrhoeic women. Oosthuyse T, Bosch AN. http://www.ncbi.nlm.nih.gov/pubmed/20199120
- Sports Med. 1993 Dec;16(6):400-30.Effect of the different phases of the menstrual cycle and oral contraceptives on athletic performance. Lebrun CM. http://www.ncbi.nlm.nih.gov/pubmed/8303141
- J Clin Endocrinol Metab. 2009 Jun;94(6):1991-2001. Epub 2009 Mar 17.Testosterone and growth hormone improve body composition and muscle performance in older men. Sattler FR, Castaneda-Sceppa C, Binder EF, Schroeder ET,

Wang Y, Bhasin S, Kawakubo M, Stewart Y, Yarasheski KE, Ulloor J, Colletti P, Roubenoff
R, Azen SP. http://www.ncbi.nlm.nih.gov/pubmed/19293261

- J Clin Endocrinol Metab. 2006 Feb;91(2):477-84. Epub 2005 Dec 6.The effects of growth hormone and/or testosterone in healthy elderly men: a randomized controlled trial. Giannoulis MG, Sonksen PH, Umpleby M, Breen L, Pentecost C, Whyte M, McMillan CV, Bradley C, Martin FC.http://www.ncbi.nlm.nih.gov/pubmed/16332938
- J Strength Cond Res. 2010 Apr;24(4):1074-81.Anabolic and catabolic hormones and energy balance of the male bodybuilders during the preparation for the competition. Mäestu J, Eliakim A, Jürimäe J, Valter I, Jürimäe
T. http://www.ncbi.nlm.nih.gov/pubmed/20300017
- J Strength Cond Res. 2009 Oct;23(7):2003-8.Hormonal responses to different resistance exercise schemes of similar total volume. Uchida MC, Crewther BT, Ugrinowitsch C, Bacurau RF, Moriscot AS, Aoki
MS. http://www.ncbi.nlm.nih.gov/pubmed/19855324
- Med Sci Sports Exerc. 2004 Sep;36(9):1499-506.Effects of sequential bouts of resistance exercise on androgen receptor expression. Willoughby DS, Taylor
L. http://www.ncbi.nlm.nih.gov/pubmed/15354030
- J Strength Cond Res. 2009 Jul;23(4):1060-7.The expression of androgen-regulated genes before and after a resistance exercise bout in younger and older men. Roberts MD, Dalbo VJ, Hassell SE, Kerksick
CM. http://www.ncbi.nlm.nih.gov/pubmed/19528872

- Can J Appl Physiol. 1997 Jun;22(3):244-55.Hormonal responses of multiset versus single-set heavy-resistance exercise protocols. Gotshalk LA, Loebel CC, Nindl BC, Putukian M, Sebastianelli WJ, Newton RU, Häkkinen K, Kraemer WJ. http://www.ncbi.nlm.nih.gov/pubmed/9189304

- J Strength Cond Res. 2005 Aug;19(3):572-82.Short vs. long rest period between the sets in hypertrophic resistance training: influence on muscle strength, size, and hormonal adaptations in trained men. Ahtiainen JP, Pakarinen A, Alen M, Kraemer WJ, Häkkinen K. http://www.ncbi.nlm.nih.gov/pubmed/16095405

- J Appl Physiol. 1992 Jun;72(6):2188-96.Endurance training amplifies the pulsatile release of growth hormone: effects of training intensity. Weltman A, Weltman JY, Schurrer R, Evans WS, Veldhuis JD, Rogol AD. http://www.ncbi.nlm.nih.gov/pubmed/1629072

Final Course Paper - Critical Review

After completing the 5 brief reviews, students will select one of the 5 topics and focus on one area in that topic to write a critical review of literature. The subject of focus for this paper must be approved by the professor. An example of a focus and topic could include neuromuscular as the topic and lactate as a contributor to fatigue. A title could be "Lactate and fatigue: a critical review of literature."

The critical review will consist of:

- APA in-text citations and appropriate bibliography
- Title Page
- Table of Contents
- Introduction to the topic

- Brief background and findings of previous literature, including methodology
- Results of current literature (focus on the articles assigned to the class)
- Discussion of the results including how and why they differ
- Conclusions of what is currently accepted based on this literature including the student's ideas for future research and what should be accepted
- Complete bibliography including the articles assigned and other supporting literature

The main differences between the critical review and the brief reviews are the specific focus, the number of references, and the length (typically 10 or more pages using Times font double-spaced and 1-inch margins). Specifically, the critical review should focus around only the focus within the topic and should include as much supporting literature as needed to defend your position.

Supporting literature for the brief reviews and the critical review should be from primary sources; typically websites and magazine articles are not acceptable references. However, if the website is reputable and is the only location for the information, then websites are appropriate. Additionally, if a website is cited to support "someone's position" on a topic this is also appropriate. For instance, if the USDA.gov published a statement on creatine then this website is acceptable, but if Joe Smith from hugebody.com (does not exist) publishes a statement on creatine, this is not acceptable. However, if the student wants to say something like "many ill-informed people think that creatine causes kidney failure in healthy adults" and then cite Joe Smith from hugebody.com, this would also be appropriate. If a student is unclear whether to use a reference he/she should contact the professor.

This assignment should be formatted following APA standard guidelines (double-spaced, 12-point Times New Roman).

Submit the assignment as a Word file (with a .doc extension). Be sure to properly name your file similar to this: smith_ja_sar710_paper, where "smith_ja" is your last name and two initials. Use underscores (Shift Minus) to separate the components of the file name.

SAR 720 Advanced Strength and Conditioning

Course Description

The focus of this course is to develop a comprehensive understanding of the physiological principles, mechanisms, and program design necessary to plan, evaluate, and modify exercise programs. Particular attention will be given to periodization techniques. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include speed, power, strength, hypertrophy, agility, bioenergetics, program design, and periodization techniques.

Required Textbook

Fleck, S.J. & Kramer, W.J. (2004). Designing resistance training programs (3rd ed.). Champaign, IL: Human Kinetics.

Students will also review and interpret scholarly peer-reviewed articles in the topics of speed, power, strength, hypertrophy, agility, bioenergetics, program design, and periodization techniques. Some of these articles will be provided to the students.

Course Goals

Upon completion of this course, the student will have:

- Reviewed and interpreted articles and complex issues in the field of strength and conditioning
- Written brief reviews of strength and conditioning topics
- Composed a final exercise program including all topics covered in the brief reviews and a short scientific rationale to accompany the training program

Course Assignments

Each assignment should consist of:

1. APA in-text citations and appropriate bibliography
2. Academy Title Page (An example title page may be found under the Resources link in the Welcome to the Course module of this course.)
3. Introduction to the topic(s)
4. Brief description(s) of the topic(s)
5. Results of current literature (focus on the articles selected)
6. Discussion of the results and how each topic differs and how they can be used (or are related) to strength and conditioning programs. Discuss pros and cons of different techniques, strategies, methods, etc. Finally, the student will give his/her assessment of each topic
7. Conclusions of what appear to be the most logical techniques, strategies, methods, etc. and why. Include ideas for future research and what should be accepted
8. Complete bibliography including the articles assigned and other supporting literature

Each brief review article should not exceed 8 pages of text using 12-point Times New Roman, double-spaced. Students must demonstrate critical thinking and appropriate interpretation of the data and research presented in the articles. Direct quotes are acceptable but should be limited and should only be used to support a conclusion drawn from the student's own opinion.

Supporting literature for the assignments should be from primary sources and the book; typically websites and magazine articles are not acceptable references. However, if the website is reputable and is the only location for the information, then websites are appropriate. Additionally, if a website is cited to support "someone's position" on a topic this is also appropriate. For instance, if the USDA.gov published a statement on creatine then this website is acceptable, but if Joe Smith from hugebody.com (does not exist) publishes a statement on creatine, this is not acceptable. However, if the student wants to say something like "many ill-informed people think that creatine causes kidney failure in healthy adults" and then cite Joe Smith from hugebody.com, this would also be appropriate. If the student is unclear whether to use a reference he/she should contact the professor.

Students must use proper American Psychological Association (APA) format for citations in text (including direct quotes) and provide an APA formatted reference list. Submit the assignment as a Word file (with a .doc extension). Be sure to properly name your file similar to this: smith_ja_sar720_assign1, where "smith_ja" is your last name and two initials. Use underscores (Shift Minus) to separate the components of the file name.

Assignment 1 - Basic Concepts of Resistance Training

Basic Concepts of Resistance Training - Chapters 1 and 2

Write a brief review discussing the various resistance training methods from chapter two and discuss how each principle in chapter one can be utilized in a strength and conditioning program. Chose a total of at least six articles from the selected reading lists on pages 12 and 51 to support your answers.

Students will read all assigned book chapters and select at least the assigned minimum articles from each chapter and write brief reviews using both the information from the book and the selected readings.

Assignment 2 - Physiological Principles and Adaptations

Psychological Principles and Adaptations - Chapters 3 and 4

Write a brief review discussing physiological principles and adaptations related to resistance training. Include all systems covered in the book. Also, discuss concurrent training, flexibility, and aerobic training. Chose a total of at least six articles from the selected reading lists on pages 128 and 147 to support your answers.

Students will read all assigned book chapters and select at least the assigned minimum articles from each chapter and write brief reviews using both the information from the book and the selected readings.

Assignment 3 - Designing a Resistance Training Program Using Various Systems and Techniques

Designing a Resistance Training Program Using Various Systems and Techniques - Chapters 5 and 6

Write a brief review discussing the necessary components used to prescribe a resistance training program including all topics from the book. Also, discuss the different resistance training systems and techniques and how each one can be utilized in a strength and conditioning program. Chose a total of at least six articles from the selected reading lists on pages 185 and 206 to support your answers.

Students will read all assigned book chapters and select at least the assigned minimum articles from each chapter and write brief reviews using both the information

from the book and the selected readings.

Assignment 4 - Training Strategies and the Detraining Phenomenon

Training Strategies and the Detraining Phenomenon - Chapters 7 and 8

Write a brief review discussing each advanced training strategy and discuss how they can be used in a strength and conditioning program. Also, discuss the detraining phenomenon including the types of detraining and the physiological mechanisms and subsequent effects on performance. Chose a total of at least six articles from the selected reading lists on pages 239 and 259 to support your answers.

Students will read all assigned book chapters and select at least the assigned minimum articles from each chapter and write brief reviews using both the information from the book and the selected readings.

Assignment 5 - Special Populations

Special Populations - Chapters 9, 10, and 11

Choose one of the three chapters/populations and write a brief review discussing the concerns and limitations of the selected population. Include all areas that need to be considered when designing a strength and conditioning program for someone in the selected population. Chose a total of at least four articles from the selected reading list associated with the selected chapter/population (pages 286, 302, or 324) to support your answers.

Students will read all assigned book chapters and select at least the assigned minimum articles from each chapter and write brief reviews using both the information from the book and the selected readings.

Final Project Instructions

After completing the five assignments, the student must select a population and write an outline for a strength and conditioning program (the program must be at least 12 weeks). Once approved by the professor, students will design the specific training program. The training program requirements are listed below.

Training Program Requirements

The following should be included in the scientific rationale for the program:

- Introduction
  - Identify the need for creating a program, why this program?
  - Identify the population here
- Purpose
  - What is the overall purpose of the entire program?
  - State the population
- Movement analysis
  - Just like the biomechanical assessment lab
  - What movements are associated with the population?
- Physiological analysis
  - What are the energy requirements of the population?
  - Be specific to positions if the population is a team sport
- Nutrition Factors
  - Briefly address caloric demands
  - Talk about nutrient timing
  - Identify any special needs

- Injury analysis
  - Identify the major and minor injuries associated with the population
- Special concerns
  - Does the population have special needs (hypertension, diabetes, orthopedic etc.)
- Training status
  - Define the training level of the population (Need to Make Some Assumptions)
    - How many years have they trained?
    - High school, college division, pro, 50 year-old non-athlete, etc.
- Physical testing and evaluation
  - What aspects will be evaluated?
- Primary resistance training goal
  - What is the goal of the strength training program?
- Test selection and administration
  - What tests will be used to evaluate the population and why?
  - Be specific
- Program design
  - Stick with training goal and include
    - Specificity
    - Overload
    - Progression
    - Etc.

- Warm-up and stretching
  - Identify the warm-up and stretching to be utilized for the population, be specific.
- Agility
  - What type (if any) of agility training will be utilized and why?
- Plyometrics
  - What type (if any) of plyometric training will be utilized and why?
- Resistance training program
  - Briefly describe the strength training program.
  - The meat of this should be in a table or chart and should include:
  - Exercise selection
  - Choice, frequency, order
  - Load
  - Volume
  - Intensity
  - Rest periods
  - Identify variations
- Stamina/bioenergetics
  - Refer back to the Physiological analysis
  - What will the program do to train all the energy systems?
  - What energy systems are needed the most?

- Program application
  - Describe how the program should be followed

- Be very detailed here, this should explain all the charts and or tables

- Discussion
  - Why was this program created? Follow up from introduction
  - Justify (using science and research) the reasoning for doing this program
  - This should include the majority of the references
- Conclusion
  - What does the program do for this population?
  - Why is this program better than any other program?
  - Make a powerful and concise conclusion

THE PROGRAM MUST BE AT LEAST 12 WEEKS. Be sure to scientifically defend the program using the book and other supporting literature. In the scientific rationale, think about trying to sell the program to a coach, player, individual, or a potential employer, as THE BEST PROGRAM for the selected population.

Supporting literature for the assignments should be from primary sources and the book; typically websites and magazine articles are not acceptable references. However, if the website is reputable and is the only location for the information, then websites are appropriate. Additionally, if a website is cited to support "someone's position" on a topic this is also appropriate. For instance, if the USDA.gov published a statement on creatine then this website is acceptable, but if Joe Smith from hugebody.com (does not exist) publishes a statement on creatine, this is not acceptable. However, if the student wants to say something like "many ill-informed people think that creatine causes kidney failure in

healthy adults" and then cite Joe Smith from hugebody.com, this would also be appropriate. If the student is unclear whether to use a reference he/she should contact the professor.

Students must use proper American Psychological Association (APA) format for citations in text (including direct quotes) and provide an APA formatted reference list.

Submit the assignment as a Word file (with a .doc extension). Be sure to properly name the file similar to this: smith_ja_sar720_finalproject, where "smith_ja" is your last name and two initials. Use underscores (Shift Minus) to separate the components of the file name.

SAR 730 Advanced Exercise Testing and Prescription

Course Description

This course is designed to develop a comprehensive understanding of exercise testing and prescription. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include preliminary health screening and risk classification, cardiovascular testing and program design, muscular strength and endurance testing and program design, body composition testing and program design, flexibility testing and program design, and balance testing and program design.

Required Textbook

Heyward, V.H., & Gibson, A. (2014). Advanced Fitness Assessment and Exercise Prescription (7th Ed.). Champaign, IL: Human Kinetics.

Students will also review and interpret scholarly peer-reviewed articles in the topics of exercise testing and prescription.

Course Goals

Upon completion of this course, the student will have:

- Reviewed and interpreted articles and complex issues in the field of exercise testing and prescription
- Written brief reviews pertaining to exercise testing and prescription
- Composed a complete review of literature pertaining to one of the topics with an emphasis of their choice (approved by the instructor)

Assignment 1 – Principles of Exercise Testing and Prescription

Principles of Exercise Testing and Prescription – Chapters 1, 2, and 3

Write a brief review discussing the purpose and components of the preliminary health evaluation as well as the purpose of physical fitness testing, components of physical fitness testing, and recommended order of events for physical fitness testing. Additionally, define and discuss the significance of test validity, reliability, and objectivity.

Assignment 2 – Cardiovascular Assessment and Program Design

Cardiovascular Assessment and Program Design – Chapters 4 and 5

Write a brief review describing some of the different maximal and submaximal exercise tests used to assess cardiovascular fitness and how these results can be used to develop an exercise program aimed at improving aerobic endurance.

Assignment 3 – Muscular Strength and Endurance Assessment and Program Design

Muscular Strength and Endurance Assessment and Program Design – Chapters 6 and 7

Write a brief review describing some of the different tests used to assess muscular strength and endurance as well as program design recommendations based off specific resistance training goals (i.e., in for strength, hypertrophy, endurance, and power).

Assignment 4 – Body Composition Assessment and Program Design

Body Composition and Program Design – Chapters 8 and 9

Write a brief review describing some of the different tests used to assess body composition – to include the benefits and limitations associated with each. Additionally, describe in detail the necessary steps used in designing an effective weight loss program.

Assignment 5 – Flexibility Assessment and Program Design

Flexibility Assessment and Program Design – Chapters 10, 11, and 12

Write a brief review describing some of the indirect and direct methods for assessing flexibility as well as some of the tests used for assessing balance. Additionally, provide program design recommendations for the purpose of improving flexibility and balance.

Final Course Paper

After the Final Paper Proposal has been approved by the instructor, the student can write and submit the Final Paper.

The Final Paper must be ~15-20 pages in length formatted following APA Style guidelines. It must be double-spaced, 12-point Times New Roman and include an Academy Title Page and Table of Contents. There are examples of both the Title Page and Table of Contents in the Resources link under the Welcome to the Course module. A running head is not required.

Make sure to follow the content organization created in your Final Paper Proposal.

It is very important to follow proper APA guidelines for citations and references. Refer to your APA Publication Manual for the correct format.

Submit the assignment as a Word file (with a .doc extension). Be sure to properly name the file similar to this: smith_ja_sar730_finalpaper, where "smith_ja" is your last name and two initials. Use underscores (Shift Minus) to separate the components of the file name.

SAR 740 Cardiovascular Physiology

Course Description

This course is designed to develop a comprehensive understanding of the cardiovascular system and the adaptations associated with exercise. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include components of the cardiovascular system, anatomy and function of the heart, conduction system of the heart, electrocardiogram interpretation, hemodynamics and peripheral circulation, cardiovascular responses and adaptations to aerobic exercise, and cardiovascular responses and adaptations to resistance exercise.

Required Textbook

Smith, D.L., Fernhall, B. (2011). Advanced Cardiovascular Exercise Physiology. Champaign, IL: Human Kinetics.

Students will also review and interpret scholarly peer-reviewed articles in the topics of exercise testing and prescription.

Course Goals

Upon completion of this course, the student will have:

- Reviewed and interpreted articles on the role and function of the cardiovascular system
- Written brief reviews pertaining to cardiovascular physiology
- Composed a complete review of literature pertaining to one of the topics with an emphasis of their choice (approved by the instructor)

Assignment 1 – Introduction to the Cardiovascular System

Introduction to the Cardiovascular System – Chapters 1, 2, and 3

Write a brief review discussing the different components of the cardiovascular system and the four periods of the cardiac cycle. Additionally, define and discuss cardiac output and stroke volume (to include preload, afterload, and contractility).

Assignment 2 – Electrical Activity of the Heart

Electrical Activity of the Heart – Chapters 4 and 5

Write a brief review describing the different phases of a myocardial action potential, differences between a skeletal muscle and myocardial muscle action potential, components of the electrocardiogram (ECG) complex (i.e., waves, segments, and intervals), and some of the different cardiac rhythms (i.e., normal, tachycardia, bradycardia, ectopic beats, and premature atrial concontractions (PAC)).

Assignment 3 – Hemodynamics and Peripheral Circulation

Hemodynamics and Peripheral Circulation – Chapters 6, 7 and 8

Write a brief review describing the structure and function of the blood vessels (to include endothelium and vascular smooth muscle) as well as the mechanisms for vasodilation and vasoconstriction.

Assignment 4 – Cardiovascular Response and Adaptations to Aerobic Exercise

Cardiovascular Response and Adaptations to Aerobic Exercise – Chapters 9 and 10

Write a brief review describing some of the cardiovascular responses and adaptations associated with aerobic exercise.

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Assignment 5 – Cardiovascular Response and Adaptations to Resistance Exercise

Cardiovascular Response and Adaptations to Resistance Exercise – Chapters 11 and 12

Write a brief review describing some of the cardiovascular responses and adaptations associated with resistance exercise.

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Final Course Paper

After the Final Paper Proposal has been approved by the instructor, the student can write and submit the Final Paper.

Your Final Paper must be ~15-20 pages in length formatted following APA Style guidelines. It must be double-spaced, 12-point Times New Roman and include an Academy Title Page and Table of Contents. There are examples of both the Title Page and Table of Contents in the Resources link under the Welcome to the Course module. A running head is not required.

Make sure to follow the content organization created in the Final Paper Proposal.

It is very important to follow proper APA guidelines for citations and references. Refer to the APA Publication Manual for the correct format.

Submit the assignment as a Word file (with a .doc extension). Be sure to properly name the file similar to this: smith_ja_sar740_finalpaper, where "smith_ja" is your last

name and two initials. Use underscores (Shift Minus) to separate the components of the file name.

SAR 745 Muscle Physiology

Course Description

This course is designed to develop a comprehensive understanding of the different facets of muscle physiology. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include muscle architecture and muscle fiber anatomy, ion channels, pumps, and binding proteins, resting and action potentials, muscle contraction, muscle metabolism, fatigue, disuse, muscle training, injury and repair, and aging.

Required Textbook

MacIntosh, B.R; Gardiner, P.F., McComas, A.J. (2006). Skeletal Muscle (2nd Ed.). Champaign, IL: Human Kinetics.

Students will also review and interpret scholarly peer-reviewed articles in the topics of exercise testing and prescription.

Course Goals

Upon completion of this course, the student will have:

- Reviewed and interpreted articles on the different facets of skeletal muscle physiology
- Written brief reviews pertaining to skeletal muscle physiology
- Composed a complete review of literature pertaining to one of the topics with an emphasis of their choice (approved by the instructor)

Assignment 1 – Muscle Architecture, Muscle Fiber Anatomy, and Ion Channels, Pumps, and Binding Proteins

Muscle Architecture, Muscle Fiber Anatomy, and Ion Channels, Pumps, and Binding Proteins – Chapters 1 and 7

Write a brief review discussing the basic structure/architecture of skeletal muscle (to include myofibrils), muscle pinnation, and muscle striation. Additionally, discuss the general properties and workings of the different ion channels and pumps (i.e., sodium, calcium, and potassium).

Assignment 2 – Resting and Action Potentials and Muscle Contraction

Resting and Action Potentials and Muscle Contraction – Chapters 9 and 11

Write a brief review describing the mechanism for and the different phases of the action potential. Additionally, discuss the sliding filament theory of muscle contraction and the cross-bridge theory of skeletal muscle.

Assignment 3 – Muscle Metabolism and Fatigue

Muscle Metabolism and Fatigue – Chapters 14 and 15

Write a brief review describing the three basic energy systems used to produce energy for muscle contraction and the different substrates used for energy metabolism. Additionally, discuss the differences between central and peripheral fatigue as well as some of the mechanical, electrical, and biochemical changes that occur in skeletal muscle as a result of fatigue.

Assignment 4 – Muscle Disuse and Training

Muscle Disuse and Training – Chapters 19 and 20

Write a brief review describing some of the different physiological changes and responses that occur in skeletal muscle as a result of disuse and muscle training (to

include specific adaptations associated with muscular hypertrophy, strength, power, and endurance training).

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Assignment 5 – Muscle Injury, Repair, and Aging

Muscle Injury, Repair, and Aging – Chapters 21 and 22

Write a brief review describing how repeated lengthening contractions (as with the case of heavy resistance training) can result in skeletal muscle injury as well as the mechanism used by the muscle to facilitate repair. Additionally, discuss some of the different physiological changes associated with aging (to include muscle fiber and motoneuron changes).

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Final Course Paper

After the Final Paper Proposal has been approved by the instructor, the student can write and submit the Final Paper.

The Final Paper must be ~15-20 pages in length formatted following APA Style guidelines. It must be double-spaced, 12-point Times New Roman and include an Academy Title Page and Table of Contents. There are examples of both the Title Page and Table of Contents in the Resources link under the Welcome to the Course module. A running head is not required.

Make sure to follow the content organization created in the Final Paper Proposal.

It is very important to follow proper APA guidelines for citations and references. Refer to the APA Publication Manual for the correct format.

Submit the assignment as a Word file (with a .doc extension). Be sure to properly name the file similar to this: smith_ja_sar745_finalpaper, where "smith_ja" is your last name and two initials. Use underscores (Shift Minus) to separate the components of the file name.

SAR 750 Exercise Endocrinology

Course Description

This course is designed to develop a comprehensive understanding of the relationship between physical activity, hormone function, and health. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include an introduction to the endocrine system, nonhormonal signaling, autonomic nervous system (ANS) and hormonal control of cardiorespiratory function, body fluid balance, hormonal control of fuel utilization and energy expenditure / intake, effects of exercise on reproductive hormones, effects of systemic hormones on endurance and resistance training adaptations, exercise and endocrine rhythms, and recommendations for measuring hormone concentrations, synthesis, and rate of secretion.

Required Textbook

Borer, K.T. (2013). Advanced Exercise Endocrinology (6th Ed.). Champaign, IL: Human Kinetics.

Students will also review and interpret scholarly peer-reviewed articles in the topics of exercise testing and prescription.

Course Goals

Upon completion of this course, the student will have:

- Reviewed and interpreted articles and complex issues pertaining to the response of the endocrine system to exercise
- Written brief reviews pertaining to exercise endocrinology

- Composed a complete review of literature pertaining to one of the topics with an emphasis of their choice (approved by the instructor)

Assignment 1 – Introduction to the Endocrine System and Nonhormonal Signaling

Introduction to the Endocrine System and Nonhormonal Signaling – Chapters 1 and 2

Write a brief review discussing the chemical characteristics used to classify hormones, biochemical properties of hormone-receptor binding, and nonhormonal mechanisms responsible for exercise-associated signal transduction.

Assignment 2 – Autonomic Nervous System (ANS) and Hormonal Control of Cardiorespiratory Function and Body Fluid Balance

Autonomic Nervous System (ANS) and Hormonal Control of Cardiorespiratory Function and Body Fluid Balance – Chapters 3 and 4

Write a brief review describing the role of the autonomic nervous system (ANS) and hormones in regulating cardiorespiratory function during exercise, thermoregulatory shifts in body water that occur during exercise, and recommended strategies for fluid management during exercise.

Assignment 3 – Hormonal Control of Fuel Utilization and Energy Expenditure / Intake

Hormonal Control of Fuel Utilization and Energy Expenditure / Intake – Chapters 5 and 6

Write a brief review describing the role of hormones in fuel mobilization and utilization during exercise (i.e., low- to moderate-intensity aerobic exercise, moderate- to high-intensity aerobic exercise, and anaerobic / resistance exercise), and the role of the "energy equation" and hormone leptin in the regulation of body fat.

Assignment 4 – Exercise and Reproductive Hormones and the Effects of Systemic Hormones on Endurance and Resistance Training Adaptations

Exercise and Reproductive Hormones and Systemic Hormones and the Effects of Systemic Hormones on Endurance and Resistance Training Adaptations – Chapters 7 and 8

Write a brief review describing the three ways in which exercise affects reproductive hormones, the role of systemic hormones in endurance, and resistance training adaptations.

Assignment 5 – Exercise and Endocrine Rhythms and Measuring Hormones

Exercise and Endocrine Rhythms and Measuring Hormones – Chapters 9 and 10

Write a brief review describing how hormone secretion periodicity affects physiological performance as well as how exercise can affect the amplitude and frequency of secretion of various hormones (e.g., growth hormone, insulin-like growth factor 1 (IGF-1), parathyroid hormone (PTH)).

Final Course Paper

After the Final Paper Proposal has been approved by the instructor, the student can write and submit the Final Paper.

Your Final Paper must be ~15-20 pages in length formatted following APA Style guidelines. It must be double-spaced, 12-point Times New Roman and include an Academy Title Page and Table of Contents. There are examples of both the Title Page and Table of Contents in the Resources link under the Welcome to the Course module. A running head is not required.

Make sure to follow the content organization created in the Final Paper Proposal.

It is very important to follow proper APA guidelines for citations and references. Refer to the APA Publication Manual for the correct format.

Submit the assignment as a Word file (with a .doc extension). Be sure to properly name the file similar to this: smith_ja_sar750_finalpaper, where "smith_ja" is your last name and two initials. Use underscores (Shift Minus) to separate the components of the file name.

SAR 755 Exercise Metabolism

Course Description

This course is designed to develop a comprehensive understanding of the regulation of various metabolic processes during exercise. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include anaerobic metabolism, lactate transport and transporters, carbohydrate metabolism during exercise, adipose tissue and skeletal muscle lipid metabolism during exercise, effects of exercise on protein and amino acid metabolism, metabolic fatigue, and endurance training-induced adaptations.

Required Textbook

Hargreaves, M., Spriet, L. (2006). Exercise Metabolism (2nd Ed.). Champaign, IL: Human Kinetics.

Students will also review and interpret scholarly peer-reviewed articles in the topics of exercise testing and prescription.

Course Goals

Upon completion of this course, the student will have:

- Reviewed and interpreted articles and complex issues pertaining to exercise metabolism
- Written brief reviews pertaining to exercise metabolism
- Composed a complete review of literature pertaining to one of the topics with an emphasis of their choice (approved by the instructor)

Assignment 1 – Anaerobic Metabolism and Lactate Transport

Anaerobic Metabolism and Lactate Transport – Chapters 1, 2, and 5

Write a brief review discussing the role of anaerobic metabolism, sources of anaerobic adenosine triphosphate (ATP), role of lactate transport system, role of the monocarboxylate transporters (MCT), and the significance of MCT1 and MCT4.

Assignment 2 – Carbohydrate Metabolism

Carbohydrate Metabolism – Chapters 3 and 4

Write a brief review describing the role of muscle glycogenolysis and glucose uptake during exercise, mechanisms of carbohydrate replenishment post-exercise, and metabolic contributions from the liver during the onset, light (or prolonged), and intense exercise.

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Assignment 3 – Lipid Metabolism

Lipid Metabolism – Chapters 6 and 7

Write a brief review describing the role and regulation of lipolysis, differences between regional and whole-body lipolysis, and effects of exercise intensity, duration, and carbohydrate availability on lipid utilization during exercise.

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Assignment 4 – Protein Metabolism

Protein Metabolism – Chapter 8

Write a brief review describing the effects of aerobic and resistance training on skeletal muscle protein synthesis, breakdown, and turnover, and influence of post-exercise ingestion of protein and/or amino acids on skeletal muscle recovery and adaptations.

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Assignment 5 – Metabolic Fatigue and Endurance Training-Induced Adaptations

Metabolic Fatigue and Endurance Training-Induced Adaptations – Chapters 9 and 10

Write a brief review describing how limitations in the energetic processes contribute to fatigue, influence of muscle mass on fatigue resistance, and effects of regular exercise on substrate availability, turnover, and oxidation.

Final Course Paper

After the Final Paper Proposal has been approved by the instructor, the student can write and submit the Final Paper.

The Final Paper must be ~15-20 pages in length formatted following APA Style guidelines. It must be double-spaced, 12-point Times New Roman and include an Academy Title Page and Table of Contents. There are examples of both the Title Page and Table of Contents in the Resources link under the Welcome to the Course module. A running head is not required.

Make sure to follow the content organization you created in your Final Paper Proposal.

It is very important to follow proper APA guidelines for citations and references. Refer to your APA Publication Manual for the correct format.

Submit the assignment as a Word file (with a .doc extension). Be sure to properly name the file similar to this: smith_ja_sar755_finalpaper, where "smith_ja" is your last name and two initials. Use underscores (Shift Minus) to separate the components of the file name.

SAR 760 Environmental Exercise Physiology

Course Description

This course is designed to develop a comprehensive understanding of the key concepts and current debates in the field of environmental exercise physiology. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include introduction to environmental exercise physiology, physiological responses to exercising in hot environments, physiological responses to exercising in the cold, physiological responses to a hyperbaric environment (diving), recommendations for exercising at altitude, and chronobiological rhythms and exercise performance.

Required Textbook

Cheung, S.S. (2010). Advanced Environmental Exercise Physiology. Champaign, IL: Human Kinetics.

Students will also review and interpret scholarly peer-reviewed articles in the topics of exercise testing and prescription.

Course Goals

Upon completion of this course, the student will have:

- Reviewed and interpreted articles and complex issues in the field of environmental exercise physiology
- Written brief reviews pertaining to environmental exercise physiology
- Composed a complete review of literature pertaining to one of the topics with an emphasis of their choice (approved by the instructor)

Assignment 1 – Exercising in Polluted Environments and Chronobiological Rhythms

Exercising in Polluted Environments and Chronological Rhythms – Chapters 1, 11, and 12

Write a brief review discussing some of the effects of pollution on health and exercise performance, recommendations for managing air pollution exposure, and effects of circadian desynchronosis (e.g., jet lag) and sleep deprivation on exercise performance.

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Assignment 2 – Exercising in Hot Environments and Hydration Strategies

Exercising in Hot Environments and Hydration Strategies – Chapters 2, 3, and 4

Write a brief review describing some of the factors that affect heat exchange, effects of hyperthermia, recommended cooling strategies, and cooling strategy recommendations.

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Assignment 3 – Exercising in Cold Environments

Exercising in Cold Environments – Chapters 5 and 6

Write a brief review describing some of the physiological responses to exercising in the cold, physiological responses to sudden cold water immersion (cold shock), and the physiological effects of hypothermia.

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Assignment 4 – Exercising at Altitude

Exercising at Altitude – Chapters 8 and 9

Write a brief review describing some of the physiological responses to exercising at altitude, influence of genetics on exercise performance at altitude, high altitude sicknesses, and recommendations for high altitude training.

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Assignment 5 – Hyperbaric and Space Exposure

Hyperbaric and Space Exposure – Chapters 7 and 10

Write a brief review describing some of the physiological responses to hyperbaric exposure (e.g., diving), hyperbaric illnesses, physiological responses to microgravity exposure (e.g., space), and exercise recommendations for microgravity exposure.

Final Course Paper

After the Final Paper Proposal has been approved by the instructor, the student can write and submit the Final Paper.

The Final Paper must be ~15-20 pages in length formatted following APA Style guidelines. It must be double-spaced, 12-point Times New Roman and include an Academy Title Page and Table of Contents. There are examples of both the Title Page

and Table of Contents in the Resources link under the Welcome to the Course module. A running head is not required.

Make sure to follow the content organization you created in your Final Paper Proposal.

It is very important to follow proper APA guidelines for citations and references. Refer to the APA Publication Manual for the correct format.

Submit the assignment as a Word file (with a .doc extension). Be sure to properly name the file similar to this: smith_ja_sar760_finalpaper, where "smith_ja" is your last name and two initials. Use underscores (Shift Minus) to separate the components of the file name.

SAR 770 Exercise Epidemiology

Course Description

This course is designed to develop a comprehensive understanding of exercise epidemiology and the role that physical inactivity plays in injury, disease, and mortality. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include physical activity and disease mortality, physical activity and risk factors, physical activity and chronic diseases, and physical activity and mental health.

Required Textbook

Dishman, R.K., Heath, G.W., Lee, I.M. (2013). Physical Activity Epidemiology (2nd Ed.). Champaign, IL: Human Kinetics.

Students will also review and interpret scholarly peer-reviewed articles in the topics of disease mortality, disease risk factors, chronic diseases, and mental health.

Course Goals

Upon completion of this course, the student will have:

- Reviewed and interpreted articles and complex issues in the field of exercise epidemiology
- Written brief reviews on exercise epidemiology topics
- Composed a complete review of literature pertaining to one of the topics with an emphasis of their choice (approved by the instructor)

Assignment 1 – Introduction to Exercise Epidemiology

Introduction to Exercise Epidemiology – Chapters 1, 2, and 3

Write a brief review defining exercise epidemiology (referred to as physical activity epidemiology in the book), discussing its origins, describing how it can be measured, and why this field of study is important.

Assignment 2 – Physical Activity and Disease Mortality

Physical Activity and Disease Mortality – Chapters 4, 5, and 6

Write a brief review describing the relationship between a sedentary lifestyle and mortality as well as the relationship between physical activity and mortality, physical activity and coronary heart disease, and physical activity and stroke. Additionally, provide physical activity training recommendations (referred to as dose response in the book) for each (i.e., all-cause mortality, coronary heart disease, and stroke).

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Assignment 3 – Physical Activity and Risk Factors

Physical Activity and Risk Factors – Chapters 7, 8, and 9

Write a brief review describing the relationship between physical activity and hypertension, physical activity and dyslipidemia, and physical activity and obesity. Additionally, provide physical activity training recommendations for each (i.e., hypertension, dyslipidemia, and obesity).

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Assignment 4 – Physical Activity and Chronic Diseases

Physical Activity and Chronic Diseases – Chapters 10, 11, 12, and 13

Write a brief review describing the relationship between physical activity and diabetes, physical activity and osteoporosis, physical activity and cancer, physical activity and immune system disorders. Additionally, provide physical activity training recommendations for each (i.e., diabetes, osteoporosis, cancer, and immune system disorders).

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Assignment 5 – Physical Activity and Mental Health

Physical Activity and Mental Health – Chapters 14, 15, 16, and 17

Write a brief review describing the relationship between physical activity and depression, physical activity and anxiety, and some of the psychological and environmental barriers to physical activity. Additionally, provide physical activity training recommendations for those dealing with depression and anxiety.

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Final Course Paper

After the Final Paper Proposal has been approved by the instructor, the student can write and submit the Final Paper.

The Final Paper must be ~15-20 pages in length formatted following APA Style guidelines. It must be double-spaced, 12-point Times New Roman and include an Academy Title Page and Table of Contents. There are examples of both the Title Page and Table of Contents in the Resources link under the Welcome to the Course module. A running head is not required.

Make sure to follow the content organization you created in your Final Paper Proposal.

It is very important to follow proper APA guidelines for citations and references. Refer to the APA Publication Manual for the correct format.

Submit the assignment as a Word file (with a .doc extension). Be sure to properly name the file similar to this: smith_ja_sar770_finalpaper, where "smith_ja" is your last name and two initials. Use underscores (Shift Minus) to separate the components of the file name.

SAR 780 Advanced Sports Nutrition

Course Description

This course is designed to develop a comprehensive understanding of complex interaction between nutrition, supplements, and sports performance. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include introduction to the three systems required to produce energy, recommendations for protein consumption, recommendations for carbohydrate consumption, recommendations for dietary fat consumption, nutrient timing, dietary strategies, functional foods and nutraceuticals, and ergogenic sports supplements.

Required Textbook

Smith-Ryan, A.E., Antonio, J. (2013). Sports Nutrition & Performance Enhancing Supplements. Ronkonkoma, NY: Linus Learning.

Students will also review and interpret scholarly peer-reviewed articles in the topics of exercise testing and prescription.

Course Goals

Upon completion of this course, the student will have:

- Reviewed and interpreted articles and complex issues in the field of sports nutrition and performance enhancing supplements
- Written brief reviews pertaining to sports nutrition and performance
- Composed a complete review of literature pertaining to one of the topics with an emphasis of their choice (approved by the instructor)

Assignment 1 – Energy Systems and Protein Recommendations

Energy Systems and Protein Recommendations – Chapters 1 and 2

Write a brief review discussing the three energy systems used for energy production (to include the substrate(s) used, product(s) produced, and duration available), different types of protein, and general protein intake recommendations for improving sport performance.

Assignment 2 – Carbohydrate and Dietary Fat Recommendations

Carbohydrate and Dietary Fat Recommendations – Chapters 3 and 4

Write a brief review discussing the major carbohydrate types and classes, glycemic index, and general carbohydrate intake recommendations (to include pre, during, and post exercise). Additionally, discuss the general dietary fat intake recommendations as well as the benefits of and intake recommendations for Omega-3 fatty acids.

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Assignment 3 – Creatine and Caffeine

Creatine and Caffeine – Chapters 5 and 6

Write a brief review describing some of the proposed benefits (to include endurance and strength/power performance), side effects, and dosage recommendations for creatine (Cr) and caffeine supplementation.

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Assignment 4 – Nutrient Timing and Dietary Strategies

Nutrient Timing and Dietary Strategies – Chapters 7 and 8

Write a brief review describing nutrient timing and endurance exercise (to include recommendations for carbohydrate, protein, and fat intake), nutrient timing and resistance exercise (to include recommendations for carbohydrate, protein, and fat intake), thermal effect of food, and macronutrient manipulation (i.e., changing the amount of dietary carbohydrate, protein, and fat in the diet in an attempt to maximize sport performance).

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Assignment 5 – Functional Foods, Nutraceuticals, and Ergogenic Sports Supplements

Functional Foods, Nutraceuticals, and Ergogenic Sports Supplements – Chapters 9 and 10

Write a brief review describing the definition and categorization of "functional foods," benefits, timing, and dosage recommendations for certain functional foods (i.e., coffee and energy drinks), and definition and examples of nutraceuticals. Additionally, discuss some of the proposed benefits, side effects, and dosage recommendations for various ergogenic sports supplements (to include specific examples aimed at improving lean muscle mass/strength/power, endurance, hydration, and mental performance).

Students will read all assigned book chapters and research at least two scholarly articles pertaining to the discussion topic and write a brief review using both the information from the book and the selected readings.

Final Course Paper

After the Final Paper Proposal has been approved by the instructor, the student can write and submit the Final Paper.

The Final Paper must be ~15-20 pages in length formatted following APA Style guidelines. It must be double-spaced, 12-point Times New Roman and include an Academy Title Page and Table of Contents. There are examples of both the Title Page and Table of Contents in the Resources link under the Welcome to the Course module. A running head is not required.

Make sure to follow the content organization you created in your Final Paper Proposal.

It is very important to follow proper APA guidelines for citations and references. Refer to the APA Publication Manual for the correct format.

Submit the assignment as a Word file (with a .doc extension). Be sure to properly name the file similar to this: smith_ja_sar780_finalpaper, where "smith_ja" is your last name and two initials. Use underscores (Shift Minus) to separate the components of the file name.

Appendix E. Elective Course Modules

SAR 715 Contemporary Issues in Health and Fitness

Course Description

The health and fitness industry is dynamic. New research is continuously changing the way we think about health and fitness programs and design. Through selected readings, current "hot topics" in the health and fitness industry will be evaluated. Topics include nutrition, exercise physiology, strength and conditioning, cardiorespiratory fitness, and body composition. This course requires a class paper.

Prerequisites

Masters Level Exercise Physiology

Course Materials

Students will review and interpret scholarly peer-reviewed articles in the topics of nutrition, exercise physiology, strength and conditioning, cardiorespiratory fitness, and body composition. Some of these articles will be provided to the students.

Course Objectives

Upon completion of this course, the student will have:

- Reviewed and interpreted articles in the field of heath and fitness.
- Written brief reviews of health and fitness topics.
- Composed a complete review of literature pertaining to one of the topics with an emphasis of their choice (approved by the instructor).

Specific Course Content

The purpose of this course is to get students involved in reading scientific literature pertaining to several aspects of the Health and Fitness industry. Specifically,

"hot topics" in the field will be evaluated by reading confounding research. Students will interpret the research articles and write brief reviews that discuss their findings and discuss what appears to be the most logical answer to dissonant findings and why.

Course Requirements

Students will read all articles for each topic and write brief reviews using the assigned readings for each topic.

Brief Reviews

Brief reviews for each topic should consist of:

- APA in-text citations and appropriate bibliography
- Title Page
- Introduction to the topic
- Brief background and findings of previous literature
- Results of current literature (focus on the articles assigned to the class)
- Discussion of the results including how and why they differ
- Conclusions of what is currently accepted based on this literature and include ideas for future research and what should be accepted
- Complete bibliography including the articles assigned and other supporting literature

Each brief review article should not exceed eight pages of text using Times font double-spaced. Students must demonstrate critical thinking and appropriate interpretation of the data and research presented in the articles. Direct quotes are acceptable but should be limited and should only be used to support a conclusion drawn from your own opinion.

Review I Reading Assignment

Nutrition

- J Int Soc Sports Nutr. 2008 Oct 2;5:15. Milk: the new sports drink? A Review. Roy BD. http://www.ncbi.nlm.nih.gov/pubmed/18831752
- Prog Neurobiol. 2010 Feb 4. [Epub ahead of print] Ammonia metabolism, the brain and fatigue; revisiting the link. Wilkinson DJ, Smeeton NJ, Watt PW. http://www.ncbi.nlm.nih.gov/pubmed/20138956
- J Int Soc Sports Nutr. 2007 Sep 26;4:8. International Society of Sports Nutrition position stand: protein and exercise. Campbell B, Kreider RB, Ziegenfuss T, La Bounty P, Roberts M, Burke D, Landis J, Lopez H, Antonio J. http://www.ncbi.nlm.nih.gov/pubmed/17908291
- J Int Soc Sports Nutr. 2010 Feb 2;7:7. ISSN exercise & sport nutrition review: research & recommendations. Kreider RB, Wilborn CD, Taylor L, Campbell B, Almada AL, Collins R, Cooke M, Earnest CP, Greenwood M, Kalman DS, Kerksick CM, Kleiner SM, Leutholtz B, Lopez H, Lowery LM, Mendel R, Smith A, Spano M, Wildman R, Willoughby DS, Ziegenfuss TN, Antonio J. http://www.ncbi.nlm.nih.gov/pubmed/20181066
- J Nutr. 2000 Apr;130(4):886-9. Metabolic consequences of a high dietary-protein intake in adulthood: assessment of the available evidence. Metges CC, Barth CA. http://www.ncbi.nlm.nih.gov/pubmed/10736347
- J Int Soc Sports Nutr. 2008 Oct 3;5:17. International Society of Sports Nutrition position stand: nutrient timing. Kerksick C, Harvey T, Stout J, Campbell B,

Wilborn C, Kreider R, Kalman D, Ziegenfuss T, Lopez H, Landis J, Ivy JL, Antonio J.http://www.ncbi.nlm.nih.gov/pubmed/18834505

- J Int Soc Sports Nutr. 2006 Dec 13;3:12-8. Effect of protein intake on strength, body composition and endocrine changes in strength/power athletes. Hoffman JR, Ratamess NA, Kang J, Falvo MJ, Faigenbaum AD. http://www.ncbi.nlm.nih.gov/pubmed/18500968

- J Strength Cond Res. 2010 Jan;24(1):48-59. Added protein maintains efficacy of a low-carbohydrate sports drink. Martínez-Lagunas V, Ding Z, Bernard JR, Wang B, Ivy JL. http://www.ncbi.nlm.nih.gov/pubmed/19924010

- Nutr Metab (Lond). 2005 Sep 20;2:25. Dietary protein intake and renal function. Martin WF, Armstrong LE, Rodriguez NR. http://www.ncbi.nlm.nih.gov/pubmed/16174292

- Int J Sport Nutr. 1991 Jun;1(2):127-45. Protein and amino acid needs of the strength athlete. Lemon PW. http://www.ncbi.nlm.nih.gov/pubmed/1844991

- Int J Sport Nutr Exerc Metab. 2000 Mar;10(1):28-38. Do regular high protein diets have potential health risks on kidney function in athletes? Poortmans JR, Dellalieux O. http://www.ncbi.nlm.nih.gov/pubmed/10722779

- Med Sci Sports Exerc. 2008 Feb;40(2):275-81. Superior endurance performance with ingestion of multiple transportable carbohydrates. Currell K, Jeukendrup AE. http://www.ncbi.nlm.nih.gov/pubmed/18202575

Review II Reading Assignment

General Exercise Physiology

- J Physiol. 2010 Jan 1; 588(Pt 1):21. Muscle-to-fat interaction: a two-way street? Pedersen BK. http://www.ncbi.nlm.nih.gov/pubmed/20045903
- Asia Pac J Clin Nutr. 2010; *19*(1):91-7. Male Ironman triathletes lose skeletal muscle mass. Knechtle B, Baumann B, Wirth A, Knechtle P, Rosemann T. http://www.ncbi.nlm.nih.gov/pubmed/20199992
- J Appl Physiol. 2009 Dec; *107*(6):1847-56. Epub 2009 Oct 15. When energy balance is maintained, exercise does not induce negative fat balance in lean sedentary, obese sedentary, or lean endurance-trained individuals. Melanson EL, Gozansky WS, Barry DW, Maclean PS, Grunwald GK, Hill JO. http://www.ncbi.nlm.nih.gov/pubmed/19833807
- Med Sci Sports Exerc. 2010 Jan; *42*(1):152-9. Caloric restriction with or without exercise: the fitness versus fatness debate. Larson-Meyer DE, Redman L, Heilbronn LK, Martin CK, Ravussin E. http://www.ncbi.nlm.nih.gov/pubmed/20010118
- J Clin Endocrinol Metab. 2007 Mar; *92*(3):865-72. Epub 2007 Jan 2. Effect of calorie restriction with or without exercise on body composition and fat distribution. Redman LM, Heilbronn LK, Martin CK, Alfonso A, Smith SR, Ravussin E; Pennington CALERIE Team.http://www.ncbi.nlm.nih.gov/pubmed/17200169
- Med Sci Sports Exerc. 2007 Jul; *39*(7):1177-85. Subcutaneous fat alterations resulting from an upper-body resistance training program. Kostek MA, Pescatello LS, Seip RL, Angelopoulos TJ, Clarkson PM, Gordon PM, Moyna NM, Visich PS, Zoeller RF, Thompson PD, Hoffman EP, Price

- Med Sci Sports Exerc. 2007 Feb; *39*(2):308-15. Effects of resistance exercise on lipolysis during subsequent submaximal exercise. Goto K, Ishii N, Sugihara S, Yoshioka T, Takamatsu K. http://www.ncbi.nlm.nih.gov/pubmed/17277595

- Med Sci Sports Exerc. 2006 May; *38*(5):840-6. Ibuprofen inhibits skeletal muscle hypertrophy in rats. Soltow QA, Betters JL, Sellman JE, Lira VA, Long JH, Criswell DS. http://www.ncbi.nlm.nih.gov/pubmed/16672835

- Med Sci Sports Exerc. 2008 Apr; *40*(4):669-76. Do sex or race differences influence strength training effects on muscle or fat? Walts CT, Hanson ED, Delmonico MJ, Yao L, Wang MQ, Hurley BF. http://www.ncbi.nlm.nih.gov/pubmed/18317378

- Med Sci Sports Exerc. 2005 Sep; *37*(9):1517-24. Gender-specific usage of intramyocellular lipids and glycogen during exercise. Zehnder M, Ith M, Kreis R, Saris W, Boutellier U, Boesch C. http://www.ncbi.nlm.nih.gov/pubmed/16177603

Review III Reading Assignment

Strength and Conditioning

- J Strength Cond Res. 2009 Dec; *23*(9):2507-14. Comparison of resistance and concurrent resistance and endurance training regimes in the development of strength. Shaw BS, Shaw I, Brown GA. http://www.ncbi.nlm.nih.gov/pubmed/19910823

- J Strength Cond Res. 2008 Sep; *22*(5):1487-502. Concurrent training enhances athletes' strength, muscle endurance, and other measures. Davis WJ, Wood DT, Andrews RG, Elkind LM, Davis WB. http://www.ncbi.nlm.nih.gov/pubmed/18714239

- Med Sci Sports Exerc. 2008 Jun; *40*(6):1087-92. Maximal strength training improves running economy in distance runners. Støren O, Helgerud J, Støa EM, Hoff J. http://www.ncbi.nlm.nih.gov/pubmed/18460997

- J Strength Cond Res. 2009 Oct 22. [Epub ahead of print] Maximal Strength Training Improves Cycling Economy in Competitive Cyclists. Sunde A, Støren O, Bjerkaas M, Larsen MH, Hoff J, Helgerud J. http://www.ncbi.nlm.nih.gov/pubmed/19855311

- J Strength Cond Res. 2009 Sep; *23*(6):1890-901. Single versus multiple sets of resistance exercise: a meta-regression. Krieger JW. http://www.ncbi.nlm.nih.gov/pubmed/19661829

- Sports Med. 1998 Aug; *26*(2):73-84. Strength training. Single versus multiple sets. Carpinelli RN, Otto RM. http://www.ncbi.nlm.nih.gov/pubmed/9777681

- Scand J Med Sci Sports. 2009 Dec 18. [Epub ahead of print] To stretch or not to stretch: the role of stretching in injury prevention and performance. McHugh MP, Cosgrave CH. http://www.ncbi.nlm.nih.gov/pubmed/20030776

- J Sci Med Sport. 2009 Nov; *12*(6):657-61. Epub 2008 Sep 3. Negative effect of static stretching restored when combined with a sport specific warm-up component. Taylor KL, Sheppard JM, Lee H, Plummer N. http://www.ncbi.nlm.nih.gov/pubmed/18768355

- J Strength Cond Res. 2009 Dec; *23*(9):2451-7. Effect of time-of-day-specific strength training on muscular hypertrophy in men. Sedliak M, Finni T, Cheng S, Lind M, Häkkinen K. http://www.ncbi.nlm.nih.gov/pubmed/19910830

Review IV Reading Assignment

Cardiorespiratory Fitness

- Med Sci Sports Exerc. 2010 Feb 26. [Epub ahead of print] High-Intensity Training Vs. Traditional Exercise Interventions for Promoting Health. Nybo L, Sundstrup

E, Jakobsen MD, Mohr M, Hornstrup T, Simonsen L, Bülow J, Randers MB, Nielsen JJ, Aagaard P, Krustrup P.http://www.ncbi.nlm.nih.gov/pubmed/20195181

- J Physiol. 2010 Mar 15; *588*(Pt 6):1011-22. Epub 2010 Jan 25. A practical model of low-volume high-intensity interval training induces mitochondrial biogenesis in human skeletal muscle: potential mechanisms. Little JP, Safdar A, Wilkin GP, Tarnopolsky MA, Gibala MJ. http://www.ncbi.nlm.nih.gov/pubmed/20100740
- Appl Physiol Nutr Metab. 2009 Jun; *34*(3):428-32. Molecular responses to high-intensity interval exercise. Gibala M. http://www.ncbi.nlm.nih.gov/pubmed/19448710
- J Physiol. 2006 Sep 15; *575*(Pt 3):901-11. Epub 2006 Jul 6. Short-term sprint interval versus traditional endurance training: similar initial adaptations in human skeletal muscle and exercise performance. Gibala MJ, Little JP, van Essen M, Wilkin GP, Burgomaster KA, Safdar A, Raha S, Tarnopolsky A.http://www.ncbi.nlm.nih.gov/pubmed/16825308
- J Physiol. 2008 Jan 1; *586*(1):151-60. Epub 2007 Nov 8. Similar metabolic adaptations during exercise after low volume sprint interval and traditional endurance training in humans. Burgomaster KA, Howarth KR, Phillips SM, Rakobowchuk M, Macdonald MJ, McGee SL, Gibala MJ. http://www.ncbi.nlm.nih.gov/pubmed/17991697
- Sports Med. 2001; *31*(15):1063-82. Long-term metabolic and skeletal muscle adaptations to short-sprint training: implications for sprint training and tapering. Ross A, Leveritt M. http://www.ncbi.nlm.nih.gov/pubmed/11735686

- J Appl Physiol. 2006 Jun; *100*(6):2041-7. Epub 2006 Feb 9. Effect of short-term sprint interval training on human skeletal muscle carbohydrate metabolism during exercise and time-trial performance. Burgomaster KA, Heigenhauser GJ, Gibala MJ. http://www.ncbi.nlm.nih.gov/pubmed/16469933

- J Appl Physiol. 2005 Jun; *98*(6):1985-90. Epub 2005 Feb 10. Six sessions of sprint interval training increases muscle oxidative potential and cycle endurance capacity in humans. Burgomaster KA, Hughes SC, Heigenhauser GJ, Bradwell SN, Gibala MJ. http://www.ncbi.nlm.nih.gov/pubmed/15705728

Review V Reading Assignment

Body Composition

- Am J Clin Nutr. 2010 May; *91*(5):1227-36. Epub 2010 Mar 17. Rapid loss of appendicular skeletal muscle mass is associated with higher allcause mortality in older men: the prospective MINOS study. Szulc P, Munoz F, Marchand F, Chapurlat R, Delmas PD. http://www.ncbi.nlm.nih.gov/pubmed/20237137

- J Gerontol A Biol Sci Med Sci. 2006 Oct; *61*(10):1059-64.

The loss of skeletal muscle strength, mass, and quality in older adults: the health, aging and body composition study. Goodpaster BH, Park SW, Harris TB, Kritchevsky SB, Nevitt M, Schwartz AV, Simonsick EM, Tylavsky FA, Visser M, Newman AB.http://www.ncbi.nlm.nih.gov/pubmed/17077199

- Obesity (Silver Spring). 2010 Jan; *18*(1):214-8. Epub 2009 Jun 18. BMI and mortality: results from a national longitudinal study of Canadian adults. Orpana HM, Berthelot JM, Kaplan MS, Feeny DH, McFarland B, Ross NA. http://www.ncbi.nlm.nih.gov/pubmed/19543208

- Lancet. 2006 Aug 19; *368*(9536):666-78. Association of bodyweight with total mortality and with cardiovascular events in coronary artery disease: a systematic review of cohort studies. Romero-Corral A, Montori VM, Somers VK, Korinek J, Thomas RJ, Allison TG, Mookadam F, Lopez-Jimenez F. http://www.ncbi.nlm.nih.gov/pubmed/16920472

- Circ Heart Fail. 2009 Jan; *2*(1):18-24. Association of multiple anthropometrics of overweight and obesity with incident heart failure: the Atherosclerosis Risk in Communities study. Loehr LR, Rosamond WD, Poole C, McNeill AM, Chang PP, Folsom AR, Chambless LE, Heiss G. http://www.ncbi.nlm.nih.gov/pubmed/19808311

- Obesity (Silver Spring). 2009 Apr; *17*(4):821-6. Epub 2009 Jan 8. Validation of DXA body composition estimates in obese men and women. LaForgia J, Dollman J, Dale MJ, Withers RT, Hill AM. http://www.ncbi.nlm.nih.gov/pubmed/19131939

- J Strength Cond Res. 2009 Jul; *23*(4):1068-76. Anthropometric estimations of percent body fat in NCAA Division I female athletes: a 4-compartment model validation. Moon JR, Tobkin SE, Smith AE, Lockwood CM, Walter AA, Cramer JT, Beck TW, Stout JR. http://www.ncbi.nlm.nih.gov/pubmed/19528870

- Eur J Appl Physiol. 2009 Jan; *105*(1):119-30. Epub 2008 Oct 21. Estimating body fat in NCAA Division I female athletes: a five-compartment model validation of laboratory methods. Moon JR, Eckerson JM, Tobkin SE, Smith AE, Lockwood CM, Walter AA, Cramer JT, Beck TW, Stout JR. http://www.ncbi.nlm.nih.gov/pubmed/18936958

- Int J Obes Relat Metab Disord. 1998 Apr; *22*(4):329-37. Six-compartment body composition model: inter-method comparisons of total body fat measurement. Wang ZM, Deurenberg P, Guo SS, Pietrobelli A, Wang J, Pierson RN Jr, Heymsfield SB. http://www.ncbi.nlm.nih.gov/pubmed/9578238

- Br J Nutr. 2008 Feb; *99*(2):432-41. Epub 2007 Sep 26. Usefulness of different techniques for measuring body composition changes during weight loss in overweight and obese women. Minderico CS, Silva AM, Keller K, Branco TL, Martins SS, Palmeira AL, Barata JT, Carnero EA, Rocha PM, Teixeira PJ, Sardinha LB. http://www.ncbi.nlm.nih.gov/pubmed/17894918

- J Strength Cond Res. 2009 Sep; *23*(6):1688-96. Are skinfold-based models accurate and suitable for assessing changes in body composition in highly trained athletes? Silva AM, Fields DA, Quitério AL, Sardinha LB. http://www.ncbi.nlm.nih.gov/pubmed/19675495

- Nutr Metab (Lond). 2010 Mar 22; 7:22. Accuracy of DXA in estimating body composition changes in elite athletes using a four compartment model as the reference method. Santos DA, Silva AM, Matias CN, Fields DA, Heymsfield SB, Sardinha LB. http://www.ncbi.nlm.nih.gov/pubmed/20307312

Class Paper - Critical Review

After completing the five brief reviews, students will select one of the five topics and focus on one area in that topic to write a critical review of literature. The subject of focus for this paper must be approved by the professor. An example of a focus and topic could include nutrition as the topic and creatine as the focus. A title could be "The truth about creatine: a critical review of literature."

The critical review will consist of:

- APA in-text citations and appropriate bibliography.
- Title Page
- Table of Contents
- Introduction to the topic
- Brief background and findings of previous literature, including methodology
- Results of current literature (focus on the articles assigned to the class)
- Discussion of the results including how and why they differ
- Conclusions of what is currently accepted based on this literature and include your ideas for future research and what you think should be accepted
- Complete bibliography including the articles assigned and other supporting literature

The main differences between the critical review and the brief reviews are the specific focus, the number of references, and the length (typically 10 or more pages using Times font double-spaced and 1-inch margins). Specifically, the critical review should focus around only the focus within the topic and should include as much supporting literature as needed to defend the position.

Supporting literature for the assignments should be from primary sources and the book; typically websites and magazine articles are not acceptable references. However, if the website is reputable and is the only location for the information, then websites are appropriate. Additionally, if a website is cited to support "someone's position" on a topic

this is also appropriate. For instance, if the USDA.gov published a statement on creatine then this website is acceptable, but if Joe Smith from hugebody.com (does not exist) publishes a statement on creatine, this is not acceptable. However, if the student wants to say something like "many ill-informed people think that creatine causes kidney failure in healthy adults" and then cite Joe Smith from hugebody.com, this would also be appropriate. If the student is unclear whether to use a reference he/she should contact the professor.

Students must use proper American Psychological Association (APA) format for citations in text (including direct quotes) and provide an APA formatted reference list. Below is a web link for an APA Tutorial: http://www.apastyle.org/learn/tutorials/basics-tutorial.aspx

SAR 725 Biomechanics of Exercise

Course Description

This course is designed to develop a comprehensive understanding of the biomechanics of human movement. Through selected readings, past and current research will be evaluated and considered for future research and application in the health and fitness industry. Topics include the biomechanics of standing, toppling, slipping, falling, landing, walking, running, jumping, gripping, pushing, pulling, lifting, lowering, carrying, throwing, striking, catching, climbing, swinging, and various airborne maneuvers (e.g., grand jeté in ballet).

Required Textbook

Chapman, A. E., Fraser, S. (2008). Biomechanical Analysis of Fundamental Human Movements. Champaign, IL: Human Kinetics.

Course Goals

Upon completion of this course, the student will have:

- Reviewed and interpreted complex issues in the field of kinesiology and biomechanics
- Written brief reviews on several of the common human movements found in sport and exercise
- Composed a complete review of literature pertaining to one of the topics with an emphasis of their choice (approved by the instructor)

Assignment 1 – Introduction to Biomechanics

Introduction to Biomechanics – Chapters 1, 2, and 3

Write a brief review listing and describing the three kinetic variables of movement. Discuss some of the various internal and external forces that act on the body.

Assignment 2 – The Biomechanics of Balance

The Biomechanics of Balance – Chapters 4 and 5

Write a brief review describing the biomechanics of standing and how variations in posture can affect energy cost. Discuss the biomechanical difference between slipping and falling as well as some recommendations for the avoidance of each. Discuss the biomechanics required for safe falling and landing.

Assignment 3 – The Biomechanics of Walking, Running, and Jumping

The Biomechanics of Walking, Running, and Jumping – Chapters 6 and 7

Write a brief review discussing the biomechanics of walking, running, and jumping as well as some of the different variations of each. Provide at least one sport-specific example in your discussion.

Assignment 4 – The Biomechanics of Object Manipulation

The Biomechanics of Object Manipulation – Chapters 8 and 10

Write a brief review discussing the biomechanics of pushing, pulling, lifting (to include lowering), and carrying as well as some of the different variations of each. Provide at least one sport-specific example in the discussion.

Assignment 5 – The Biomechanics of Throwing, Striking, Catching, and Airborne Maneuvers

The Biomechanics of Throwing, Striking, and Catching and Airborne Maneuvers – Chapters 9 and 11

Write a brief review discussing the biomechanics of throwing, striking, and catching as well as some of the different variations of each between. Provide at least one sport-specific example in the discussion.

Final Course Paper

After the Final Paper Proposal has been approved by the instructor, the student can write and submit the Final Paper.

The Final Paper must be ~15-20 pages in length formatted following APA Style guidelines. It must be double-spaced, 12-point Times New Roman and include an Academy Title Page and Table of Contents. There are examples of both the Title Page and Table of Contents in the Resources link under the Welcome to the Course module. A running head is not required.

Make sure to follow the content organization created in the Final Paper Proposal. It is very important to follow proper APA guidelines for citations and references. Refer to the APA Publication Manual for the correct format.

Submit the assignment as a Word file (with a .doc extension). Be sure to properly name the file similar to this: smith_ja_sar725_finalpaper, where "smith_ja" is your last name and two initials. Use underscores (Shift Minus) to separate the components of the file name.

Appendix F. Doctor of Education in Applied Exercise Science Program Description

The Academy's Doctor of Education in Applied Exercise Science program is a 66-semester hour program and currently the only online exercise physiology doctoral program in existence.

The curriculum is designed to enable recent master's degree graduates, working professionals and sports enthusiasts to achieve their personal, educational and professional objectives. The program is flexible and provides meaningful educational and technical preparation. Recent doctoral degree graduates are practicing exercise physiologists, college professors of Exercise Science, fitness/health/wellness directors, collegiate/professional sports team strength and conditioning coaches, and high school/college athletic directors.

Academy courses are offered online so that students can conveniently take courses at any time and from anywhere. Students can also enroll and start their studies at any time.

Doctoral Program Details

- Course Descriptions
- Admissions Requirements

To start the admissions process, please complete our online application. If you have further questions, please contact an admissions counselor at: (800) 223-2668 or admissions@ussa.edu.

All Academy students can now take the doctoral program or individual courses on campus. The new three-year residential doctoral program schedule offers courses at 6-8 p.m. on Monday and Wednesdays or Tuesdays and Thursdays during the Fall, Spring and

Summer semesters. For more information about the program and schedule, please click here.

Major Areas of Study

The Academy's Doctor of Education (EdD) in Applied Exercise Science degree is a 66-semester hour program beyond the master's degree. The doctoral degree is designed to prepare students to perform with a high degree of efficiency and proficiency in the field of exercise science and physiology. There are two areas of specialization with the EdD and students must select one: Human Anatomy and Physiology or Exercise Biochemistry.

As part of the curriculum, students will take a practical, field-based component called a Mentorship. The Mentorship requires students to engage in hands-on, sports-related activities in the industry.

Current Emphases Available

Students in the Academy's doctoral program may add to the 66-semester hour program an Emphasis in the areas of: Olympism, Sports Theory, Sports Coaching, Sports Management, or, for those already licensed or certified in the area, Sports Medicine. A program of study for the EdD Emphasis Areas may be found here.

Doctoral Degree Program with an Emphasis in Olympism

The Doctor of Education (EdD) in Applied Exercise Science with an emphasis in Olympism is a 66-semester hour program beyond the master's degree. This degree is designed to prepare students for administrative roles in the world Olympic Movement. Students are selected on the basis of academic and professional accomplishments, past

experiences, skills, and personal goals. Students should have had some experience in Olympic sports on the national or international level.

To obtain the Emphasis in Olympism, a doctoral student will take the following three courses:

SAB 622 Structure and Function of the Olympic Games (3 sem. hrs.)

The structure and function of the Olympic movement, starting with the International Olympic Committee and moving through the national governing bodies to international sports associations, is the focus of this course. It emphasizes the unique characteristics of the Olympic Movement and various political, social, and economic impacts on the Games. This course requires a final exam.

SAB 651 Issues in the Olympic Movement (3 sem. hrs.)

The impact of contemporary issues on the Olympic Movement, whether they are governmental, intellectual, societal, cultural, political, or economic, is the focus of this course. Through selected readings, factors such as race, gender, religion, nationalism, drug use, commercialism, and violence and their influence on the Olympic Movement are taken into consideration. This course requires a class paper.

SAB 667 Olympism (3 sem. hrs.)

This course examines the growth and development of the modern Olympic Games through the eyes of their founder, Pierre de Coubertin. The International Olympic Committee has published selected writings by de Coubertin that include the search for a vision, the events leading up to the Olympic renewal, historical perspectives of the Olympics, the philosophical and educational dimensions of Olympism, and the Olympic Movement. This course requires a class paper.

Doctoral Degree with an Emphasis in Sports Theory

The Doctor of Education (EdD) degree in Applied Exercise Science with an emphasis in Sports Theory is a 66-semester hour program beyond the master's degree. This degree is designed to prepare students for varying roles in sports organizations and the world of sport. Students are selected on the basis of academic and professional accomplishments, past experiences, skills, and personal goals.

To obtain the Emphasis in Sports Theory, a doctoral student will take the following three courses:

SAB 659 Group Dynamics in Sports (3 sem. hrs.)

This course offers an in depth study of the influence of teams on the individual performance and the influence of individuals on team performance in sport and exercise settings. There is a particular focus on interpersonal aspects such as cohesion and leadership. This course requires a class paper.

SAB 791 Selected Readings in Sports Theory (3 sem. hrs.)

The goal for this course is to conduct database searches on an approved topic in sports theory. In this course students will present a comprehensive analysis and application of the approved topic within the scope of sports theory. It is advisable to compile readings and research on topics that may relate to one's dissertation topic. This course requires a class paper.

SAM 735 Strategic Planning for Sports Organizations (3 sem. hrs.)

This course is designed to provide an analysis of strategic planning, including the development of vision and mission statements and the use of environmental scans, gap analysis, action planning, and benchmarking. A variety of strategic issues in sports will be

explored. An understanding of the policies and mechanics of strategic planning in sports will be examined and analyzed. This course requires a class paper.

Doctoral Degree with an Emphasis in Sports Coaching

The Doctor of Education (EdD) degree in Applied Exercise Science with an emphasis in Sports Coaching is a 66-semester hour program beyond the master's degree. This degree is designed to prepare students to complete numerous responsibilities associated with coaching individuals in team and/or individual sport settings. The area of specialization places emphasis on the academic areas of management and psychology as applied to Sports Coaching. Students are selected on the basis of academic and professional accomplishments, past experiences, skills, and goals. Students should have some experience in Sports Coaching.

To obtain the Emphasis in Sports Coaching, a doctoral student will take the following three courses:

SAB 657 Psychology of Elite Performance (3 sem. hrs.)

This course examines the psychological factors that are most critical to elite sport performances. Special emphasis is focused on the physical, mental, and emotional variables related to optimal performance conditions. Theory and practice for athletes and coaches will be discussed. This course requires a final exam.

SAB 670 Selected Readings in Sports Coaching (3 sem. hrs.)

This course will provide students an opportunity to conduct a series of literature reviews about an approved sports coaching topic. The selected topic should include literature reviews pertaining to the concepts and/or issues faced by coaches while performing their coaching responsibilities. The focus of this course is to enhance the

student's research and composition abilities while gaining in-depth knowledge regarding the profession of sports coaching. This course requires a class paper.

SAB 671 Advanced Coaching Theories (3 sem. hrs.)

This course allows students to select sports coaching readings from a preselected reading list in order to complete a series of book reports. These sports coaching readings will consist of topics such as leadership, communication, management, skill acquisition, and risk management. The focus of this course is to enhance the student's knowledge concerning the profession of sports coaching. This course requires a class paper.

Doctoral Degree with an Emphasis in Sports Management

The Doctor of Education (EdD) degree in Applied Exercise Science with an emphasis in Sports Management is a 66-semester hour program beyond the master's degree. This degree is designed to prepare students for careers as college professors of Sports Management, private sport entrepreneurs and high school or college athletic directors. Students are selected on the basis of academic and professional accomplishments, past experiences, skills, and personal goals.

To obtain the Emphasis in Sports Management, a doctoral student will take the following three courses:

SAB 634 Ethics in Sport (3 sem. hrs.)

This course is concerned with the study of Sports Management ethics and the manner in which ethics can be applied and implemented in an individual's personal and professional life. The student will be reminded that "whereas ethics are precepts of right and wrong in our behavior and judgments, the word morality often refers to a way of life,

to beliefs, attitudes, motives, and values individuals learn and exhibit in a social context." This course requires a class paper.

SAM 660 Financial Aspects of Sports (3 sem. hrs.)

This course involves an in-depth study of the financial challenges facing contemporary sports administrators, including an examination of financial data analysis, sources of funding, budgeting and financial accountability, inventory management and production control processes, profit distribution, taxation, and accounting processes. This course requires a final exam.

SAM 786 Legal Aspects of Sports (3 sem. hrs.)

An in-depth examination of areas of the law that are particularly relevant to sports. Specifically, developments in negligence law, contract law, and constitutional law as they apply to sports are considered, and recent developments and trends are studied. This course is designed to build on previous studies of law and sports to provide students with opportunities for in-depth study and appreciation of the legal aspects of sports and the most significant current impacts of law on sports. This class requires a final exam.

Doctoral Degree with an Emphasis in Sports Medicine

The Doctor of Education (EdD) in Applied Exercise Science with an emphasis in Sports Medicine is a 66-semester-hour program beyond the master's degree. The degree is designed to prepare students to perform tasks in the Sports Medicine profession with a high degree of proficiency. The area of specialization focuses on management courses as applied to Sports Medicine. Students are selected on the basis of academic and professional accomplishments, past experiences, skills, and goals.

Students ordinarily have had some experience as teachers, athletic trainers, or Sports Medicine administrators and have shown promise of being able to further develop management skills through training and research. As part of its practical experience component, the Academy requires each student to complete a mentorship in which the student engages in doctorate level management of Sports Medicine-related activities.

To obtain the Emphasis in Sports Medicine, a doctoral student will take the following three courses:

SAM 787 Legal Concepts in Sports Medicine (3 sem. hrs.)

This course provides an in-depth examination of areas of the law that are particularly relevant to Sports Medicine professionals including a study of the legal concepts, issues, cases, and decisions that affect the Sports Medicine profession. This class requires a final exam.

SAM 788 Principles of Management in Sports Medicine (3 sem. hrs.)

In this course, the administrative components of Sports Medicine are explored. Topics include advanced concepts of legal liability, financial management, scheduling, supervision, documentation, and general administration. This class requires a final exam.

SAM 789 Seminar in Sports Medicine Management Issues (3 sem. hrs.)

This course is an advanced study of historical foundations, contemporary trends and issues, organizational planning, and risk management in the field of Sports Medicine. Topics include an in-depth case analysis of the role of Sports Medicine, traditional and non-traditional settings in Sports Medicine, and the impact of health-care reforms on the profession of Sports Medicine. This class requires a class paper.

Cognate Courses

Students must successfully complete (with a grade of B or better) two cognate courses (6 semester hours) from a related area of their Specialization or Emphasis to support the selected Specialization or Emphasis.

The selected cognate courses will enhance the student's knowledge of, and familiarity with, the details of the chosen Specialization or Emphasis, thus establishing an unquestionable subject matter credentialing for the student in the designated Specialization or Emphasis.

The Specialization Related Electives (SRE) and the Emphasis Related Electives (ERE) must be approved by submitting a cognate course pre-approval form to the Director of Doctoral Studies prior to enrolling in them. SREs and EREs augment the area of Specialization or Emphasis chosen by the student. A minimum of 15 semester hours must be completed and an area of specialization must be selected before seeking cognate course approval.

Electives

The 66-semester-hour curriculum includes the required core courses, specialization courses previously cited, and three elective courses (9 semester hours) selected from the following list:

- SAB 657 Psychology of Elite Performance (3 sem. hrs.)
- SAB 659 Group Dynamics in Sports (3 sem. hrs.)
- SAB 670 Selected Readings in Sports Coaching (3 sem. hrs.)
- SAB 671 Advanced Coaching Theories (3 sem. hrs.)
- SAR 715 Contemporary Issues in Health and Fitness (3 sem. hrs)

- SAR 725 Biomechanics of Exercise (3 sem. hrs.)
- SAM 790 Selected Topics in Sports (3 sem. hrs.)
- SPT 797 Directed Individualized Study (3-6 sem. hrs.)

If a student has taken 500 or 600 level courses at the master's level to fulfill master's degree requirements, those same courses cannot be used to fulfill the doctoral degree requirements.

Appendix G. Accelerated Degree Program Course Descriptions

SAR 510 Sports Biomechanics (3 semester hours)

This course is a comprehensive study of human movement as it relates to sports and exercise. It covers how the study of biomechanics can promote human performance and prevent injury. This course requires a final exam.

SAR 511 Sports Performance Enhancement (3 semester hours)

The course is designed for sports coaches to study human movement as it relates to sports activities. Coaching techniques and methodology are addressed in regard to analyzing skills and improving sports performance. This course requires a final exam.

SAR 520 Exercise Physiology (3 semester hours)

This course is a study of various factors that affect human performance, including regulatory mechanisms, adaptations, and changes that occur as a result of physical activity. This course requires a final exam.

SAR 525 Sports Strength and Conditioning (3 semester hours)

This course is designed to study the fundamental principles of training and nutrition in sports and exercise. It is intended to develop knowledge of the anatomical and physiological systems challenged by sports conditioning and strength training, and to develop an awareness of fitness and nutrition programming. Ideas can be used to enhance individual and team performance in sports. This course requires a final exam.

SAR 580 Exercise Testing and Prescription (3 semester hours)

This course is a concentrated study of the principles of exercise testing and prescription for healthy and diseased states. The prerequisite for this course is SAR 520. This course requires a final exam.

SAD 546 Seminar in Sports Medicine (3 semester hours)

This course provides an overview of the profession. It is designed to educate athletic trainers, fitness professionals, and sports coaches on how to assess and manage sports injuries. This course requires a final exam.

SAD 556 Issues in Nutrition and Health (3 semester hours)

This course covers the principles of sound nutrition as they relate to the athlete as well as to the average individual in our society. In addition, it covers physiological aspects: how nutrition affects the body in terms of optimal health. This course requires a final exam.

SAD 562 Scientific Principles of Resistance Training (3 semester hours)

This course provides study of resistance training, including physiological and psychological aspects, basic concepts and principles, types of programs and training, and benefits for specific populations. The information necessary to understand and successfully design any resistance-training program is presented in this course. This course requires a final exam.

Appendix H. Doctor of Education in Applied Exercise Science
Program of Study for Emphasis Courses
Olympism, Sports Theory, Sports Coaching, Sports Management, and Sports Medicine

NOTE: Students in the EdD in Applied Exercise Science program who wish to seek an Emphasis in Olympism, Sports Theory, Sports Coaching, Sports Management, or Sports Medicine must complete this program of study as an attachment to their original POS. Complete only the Emphasis section that applies.

A. Emphasis in Olympism	**Credit Hours**	**Hours**	**Semester**	**Grade**
SAB 622 Structure and Function of the Olympic Games	3			
SAB 651 Issues in the Olympic Movement	3			
SAB 667 Olympism	3			
B. Emphasis in Sports Theory	**Credit Hours**	**Hours**	**Semester**	**Grade**
SAB 791 Selected Readings in Sports Theory	3			
SAM 735 Strategic Planning for Sports Organizations	3			
SAB 659 Group Dynamics in Sports	3			
C. Emphasis in Sports Coaching	**Credit Hours**	**Hours**	**Semester**	**Grade**
SAB 657 Psychology of Elite Performance	3			
SAB 670 Selected Readings in Sports Coaching	3			
SAB 671 Advanced Coaching Theories	3			
D. Emphasis in Sports Management	**Credit Hours**	**Hours**	**Semester**	**Grade**
SAB 634 Ethics in Sport	3			
SAM 660 Financial Aspects of Sports	3			
SAM 786 Legal Aspects of Sports	3			
E. Emphasis in Sports Medicine	**Credit Hours**	**Hours**	**Semester**	**Grade**
SAM 787 Legal Concepts of Sports Medicine	3			
SAM 788 Principles of Management in Sports Medicine	3			
SAM 789 Seminar in Sports Medicine Management Issues	3			

All students are REQUIRED to successfully complete their Doctoral Degree Portfolio

Portfolio	*Credit Hours*	*Hours*	*Semester*	*Grade*
SPT PRTD Doctoral Portfolio	0	0		

The Program of Study is not considered a contract between the student and the institution and is subject to change at any time and at the sole discretion of the institution. It is the student's responsibility to ensure all degree requirements are met.