American Public University System

The Ultimate Advantage is an Educated Mind

School of Science, Technology, Engineering, and Math
Department of Information Technology
ISSC343: Wireless Networks
3 Credit Hours
8 Week Course
Prerequisite(s): MATH110, MATH111, MATH125 or MATH225

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Course Description (Catalog)

This course offers a framework for learning the latest developments and trends in ad-hoc wireless and mobile communications. The course provides a complete coverage of the wireless ad-hoc networks: principles, protocols and applications. The course will look at the characteristics and operations of contemporary ad-hoc wireless network technologies Students will study the impact of wireless transmission and user mobility with an emphasis on the design and management of ad-hoc wireless mobile systems. Students must have access to MS Visio software. Course software requirements with the appropriate versions are listed under the course materials site. This course meets the topical requirements of the DoD Directive 8570.1M Information Assurance Management (IAM) Technical I category. (Prerequisites: MATH110, MATH111, MATH125 or MATH225)

Course Scope

The purpose of this course is to provide a broad survey of wireless communications including in-depth coverage of protocols, transmission methods, and IEEE 802.11 standards. This course offers a framework for learning the latest developments and trends in ad-hoc wireless mobile communications. The course will look at the characteristics and operation of contemporary ad-hoc wireless network technologies Students will study the impact of wireless transmission and user mobility with an emphasis on the design and management of ad-hoc wireless mobile systems.

Note to Students: The course materials, assignments, learning outcomes, and expectations in this upper level undergraduate course assume that the student has completed all lower level general education and career planning coursework necessary to develop research, writing, and critical thinking skills. Students who have not fulfilled all general education requirements through courses or awarded transfer credit should strongly consider completing these requirements prior to registering for this course.

Course Objectives

The successful student will fulfill the following learning objectives:

CO1: Explain the concepts and procedures for wireless and mobile networks in general.

CO2: Explain existing mobile and wireless network technologies such as WLAN, Wi-Fi IEEE 802.11 b/g, WiMAX IEEE 802.16, Bluetooth, IrDA, and ZigBee.

CO3: Describe the main design choices for existing and future mobile and ad-hoc wireless network systems.

CO4: Explain mobility support in the context of IP.

CO5: Describe medium access issues and the effect of mobility on end-to-end transport protocols such as TCP.

CO6: Describe the challenges of working with ad-hoc wireless networking.

CO7: Compare and contrast aspects of wireless networks including speed of wireless links, scalability, mobility, stability of connectivity, reliability, battery power and other limitations.

CO8: Apply wireless networks in case studies for PANs, academic, defense, industrial, healthcare, vehicular, and other ad-hoc network situations.

Course Delivery Method

This eight-week course delivered in the APUS Sakai via distance learning will enable students to complete academic work in a flexible manner, completely online. Course materials and access to an online learning management system will be made available to each student.

Online assignments are due by the last day of each week (Sunday at 11:55 pm) and include forum questions (accomplished in groups through a threaded forum), quizzes (graded electronically), and individual assignments (submitted for review by the Faculty Member).
Assigned faculty will support the students throughout this eight-week course.

1. Primary communication for the course will take place via **Announcements** and **Messages**. It is your responsibility to check these resources on a daily ongoing basis.
2. You can find links for the eBook within **Lessons** under the link **Readings & Resources**.
3. Also within **Readings & Resources** you will find links to the PowerPoint lessons presentations and a list of additional resources.
4. Lab instructions are found within **Lessons** under the **Lab** link.
5. Lab Instructional Videos are also found within **Lessons** under the **Lab** link.
6. Lab Assessment Questions sheets are available for download through **Assignments**.
7. Key words to help with understanding the topics being covered each week will be within the weekly **Announcements** (For example announcement Week 1: ……..)
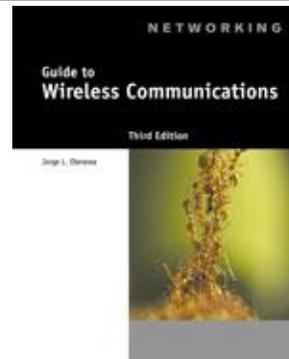
Resources

Required Text (eBook):
Jorge L. Olenewa (2014). *Guide to Wireless Communications, 3rd Edition*.
Course Technology Incorporated, ISBN-10: 1111307318, ISBN-13: 9781111307318.

Software Requirements
1. Microsoft Office (MS Word, MS PowerPoint, MS Excel)
2. Microsoft Visio – Required
3. IE, Firefox (Recommended), Chrome

4. Acrobat Reader

Evaluation Procedures

The grading will be based on six graded assignments, eight weekly quizzes, eight weekly forums, a paper and a case study.

1. There will be **eight forums** (3.13% each) counting a total of 25% of the final grade. Answers should restate the question with supporting sentences using the terms, concepts, and theories from the required readings. The key requirement is to express your idea and then support your position to demonstrate that you understand the material. Your answer should be a **minimum of 250 words**.

   In addition, you are to **respond** to at least **two** of your classmates' postings by commenting on, supporting or supplementing the other students' answers. Your responses should be **at least 100 words long**. All responses should be courteous with sound supporting sentences. You may respond multiple times within a continuous discussion with points and counter points. Duplicate responses **will not** receive credit.

2. There will be **five assignments** (4% each) counting a total of 20% of the final grade. You can access Assignments by clicking on **Assignments tool**. Step-by-Step instructions for each assignment are available. Submit deliverables through the **Assignments** link within your course.

3. There will be **eight quizzes** (3.13% each) counting a total of 25% of the final grade. Each quiz will consist of 10 multiple choice questions pulled from chapters covered in that week's lesson material. Each quiz is timed, and has a two hour time limit.

4. There will be **four exercises** towards the paper during this term counting a total of 30% of the final grade, completed as follows:

   a. Week 2 Assignment 2 Topic Selection – selection of topic for the Week 7 Research Paper.
   b. Week 4 Outline – outline of topics and subtopics for the Week 7 Research Paper. (5%)
   c. Week 7 Research Paper – present research paper on your chosen topic. (15%)
   d. Week 8 Case Study (10%)

   Below is a list of pre-approved topics for the Week 7 Research Paper:

   - Best Practices for WLAN Security
   - Wireless Ad hoc and Sensor Networks
   - Mobile ad hoc networking: MANET
   - Mobile Computing and Social Networking
   - Modern Day Attacks Against Wireless Networks

   The key to the research assignment is to demonstrate your understanding of the topics, not to re-word the text or reference material.

The paper will follow a conventional report format (introduction, body, conclusion, references). The paper is to follow the APA style guide, Sixth Edition (available via bookstores). Also refer to APA's online resources: http://apastyle.apa.org/learn/tutorials/basics-tutorial.aspx and the APUS web site: http://www.apus.edu/Online-Library/tutorials/apa.htm

Note: Review **Announcements** and **Lessons** for additional instructions and course materials.

5.   Each week you will also have chapter readings assigned, and PowerPoint presentations to review.

All assignments, labs, forum questions and quizzes are required for submission by 11:55 PM Eastern Time of the Sunday of the week assigned

Graded Items	Week Due	% of Final Grade
Forums	Weeks 1-8 (3.13% each)	25%
Quizzes	Weeks 1-8 (3.13% each)	25%
Assignments	Weeks 1-3, 5, 6 (4% each)	20%
Week 4 Outline	Week 4	5%
Week 7 Research Paper	Week 7	15%
Week 8 Case Study	Week 8	10%
Total		**100 %**

Grading Scale

Please see the Student Handbook to reference the University's grading scale.

Course Outline

Course Deadlines/Milestones

- Participation in forums is required Week 1 through Week 8.
- Completion of quizzes is required Week 1 through Week 8.
- Week 2 – select research topic.
- Week 4 – submit outline for Week 7 Research Paper. No midterm exam.
- Week 7 – Research Paper due (full details within **Announcements**).
- Week 8 – Case Study due – no final exam.
- Ninth Week: Final grades submitted by instructor.

Week	Lesson	Learning Objective(s)	Activities
1	**Course overview Introduction to Wireless Communication**	CO1: Explain the concepts and procedures for wireless and mobile networks in general.	Reading: Chapter 1 PPT Review: Lessons 1 Week 1 Forum Week 1 Assignment Week 1 Quiz
2	**Wireless Data Transmission**	CO2: Explain existing mobile and wireless network technologies such as WLAN, Wi-Fi IEEE 802.11 b/g, WiMAX IEEE 802.16, Bluetooth, IrDA, and ZigBee.	Reading: Chapters 2 and 3 PPT Review: Lessons 2 and 3 Week 2 Forum Week 2 Assignment Research Paper topic selection Week 2 Quiz
3	**How Antennas Work**	CO3: Describe the main design choices for existing and future mobile and ad-hoc wireless network systems.	Reading: Chapters 4 PPT Review: Lesson 4 Week 3 Forum Week 3 Assignment Week 3 Quiz
4	**Low Rate Wireless Personal Area Networks**	CO4: Explain mobility support in the context of IP	Reading: Chapters 5 and 6 PPT Review: Lessons 5 and 6 Week 4 Forum Week 4 Assignment Research Paper Outline Week 4 Quiz
5	**Low-Speed Wireless Local Area Networks**	CO5: Describe medium access issues and the effect of mobility on end-to-end transport protocols such as TCP.	Reading: Chapter 7 PPT Review: Lesson 7 Week 5 Forum Week 5 Assignment Week 5 Quiz
6	**High-Speed WLANs and WLAN Security**	CO6: Describe the challenges of working with ad-hoc wireless networking.	Reading: Chapters 8 and 9 PPT Review: Lessons 8 and 9 Week 6 Forum Week 6 Assignment Week 6 Quiz
7	**Wireless Wide Area Networks**	CO7: Compare and contrast aspects of wireless networks including speed of wireless links, scalability, mobility, stability of connectivity, reliability, battery power and other limitations.	Reading: Chapters 10 PPT Review: Lesson 10 Week 7 Forum Week 7 Quiz Week 7 Research Paper Due
8	**Wireless Communications in Business**	CO8: Apply wireless networks in case studies for PANs, academic, defense, industrial, healthcare, vehicular, and other ad-hoc network situations.	Reading: Chapters 11 and 12 PPT Review: Lesson 11 and 12 Week 8 Forum Week 8 Quiz Week 8 Case Study Due

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Policies

Please see the **student handbook** to reference all University policies. Quick links to frequently asked question about policies are listed below.

Drop/Withdrawal Policy
Plagiarism Policy
Extension Process and Policy

Writing Expectations
All written submissions should be submitted in a font and page set-up that is readable and neat. It is recommended that students try to adhere to a consistent format, which is described below.
- Typewritten in double-spaced format with a readable style and font and submitted inside the electronic classroom (unless classroom access is not possible and other arrangements have been approved by the professor).
- Arial 11 or 12-point font or Times New Roman styles.
- Page margins Top, Bottom, Left Side and Right Side = 1 inch, with reasonable accommodation being made for special situations and online submission variances.

Citation and Reference Style
Assignments completed in a narrative essay or composition format must follow APA guidelines. This course will require students to use the citation and reference style established by the American Psychological Association (APA), in which case students should follow the guidelines set forth in *Publication Manual of the American Psychological Association* (6th ed.) (2010). Washington, D.C.: American Psychological Association.

Late Assignments
Students are expected to submit classroom assignments by the posted due date and to complete the course according to the published class schedule. As adults, students, and working professionals I understand you must manage competing demands on your time. Should you need additional time to complete an assignment please contact me before the due date so we can discuss the situation and determine an acceptable resolution. Routine submission of late assignments is unacceptable and may result in points deducted from your final course grade. Assignments submitted late without a prearranged extension will be subject to a 10% late penalty. **No late assignments will be accepted after the last day of the course.**

Netiquette
Online universities promote the advancement of knowledge through positive and constructive debate – both inside and outside the classroom. Forums on the Internet, however, can occasionally degenerate into needless insults and "flaming." Such activity and the loss of good manners are not acceptable in a university setting – basic academic rules of good behavior and proper "Netiquette" must persist. Remember that you are in a place for the rewards and excitement of learning which does not include descent to personal attacks or student attempts to stifle the Forum of others.

- Technology Limitations: While you should feel free to explore the full-range of creative composition in your formal papers, keep e-mail layouts simple. The Sakai classroom may not fully support MIME or HTML encoded messages, which means that bold face, italics, underlining, and a variety of color-coding or other visual effects will not translate in your e-mail messages.
- Humor Note: Despite the best of intentions, jokes and especially satire can easily get lost or taken seriously. If you feel the need for humor, you may wish to add "emoticons" to help alert your readers: ;-), :), □

Disclaimer Statement
Course content may vary from the outline to meet the needs of this particular group.

Academic Services	TOC

Online Library Research Center & Learning Resources
The Online Library Resource Center is available to enrolled students and faculty from inside the electronic campus. This is your starting point for access to online books, subscription periodicals, and Web resources that are designed to support your classes and generally not available through search engines on the open Web. In addition, the Center provides access to special learning resources, which the University has contracted to assist with your studies. Questions can be directed to orc@apus.edu.

- ***Charles Town Library and Inter Library Loan:*** The University maintains a special library with a limited number of supporting volumes, collection of our professors' publication, and services to search and borrow research books and articles from other libraries.
- ***Electronic Books:*** You can use the online library to uncover and download over 50,000 titles, which have been scanned and made available in electronic format.
- ***Electronic Journals:*** The University provides access to over 12,000 journals, which are available in electronic form and only through limited subscription services.

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Selected Bibliography

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Sarkar, Subir Kumar, Basavaraju, T. G., & Puttamadappa, C. (2013). Ad Hoc Mobile Wireless Networks: Principles, Protocols, and Applications, 2nd ed. CRC Press. (349 pages). ISBN-10: 1466514469; ISBN-13: 978-1466514461

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Wong, S. (2003, May 200). The evolution of wireless security in 802.11 networks: WEP, WPA and 802.11 standards. *Leetupload*. Retrieved from http://www.leetupload.com/database/Misc/Papers/WIRELESS/SHELF/paper1109.pdf

Appendix A – Grading Rubric

All written assignments will be assessed according to this rubric. Note that a score of 0 may be assigned in any category where your work does not meet the criteria for the beginning level.

APUS Assignment Rubric Undergraduate Level 300-400	EXEMPLARY LEVEL 4	ACCOMPLISHED LEVEL 3	DEVELOPING LEVEL 2	BEGINNNIG LEVEL 1	TOTAL POINTS
FOCUS/THESIS	Student exhibits a defined and clear understanding of the assignment. Thesis is clearly defined and well constructed to help guide the reader throughout the assignment. Student builds upon the thesis of the assignment with well-documented and exceptional supporting facts, figures, and/or statements.	Establishes a good comprehension of topic and in the building of the thesis. Student demonstrates an effective presentation of thesis, with most support statements helping to support the key focus of assignment.	Student exhibits a basic understanding of the intended assignment, but the thesis is not fully supported throughout the assignment. While thesis helps to guide the development of the assignment, the reader may have some difficulty in seeing linkages between thoughts. While student has included a few supporting facts and statements, this has limited the quality of the assignment.	Exhibits a limited understanding of the assignment. Reader is unable to follow the logic used for the thesis and development of key themes. Introduction of thesis is not clearly evident, and reader must look deeper to discover the focus of the writer. Student's writing is weak in the inclusion of supporting facts or statements.	10
CONTENT/SUBJECT KNOWLEDGE	Student demonstrates proficient command of the subject matter in the assignment. Assignment shows an impressive level of depth of student's ability to relate course content to practical examples and applications. Student provides comprehensive analysis of details, facts, and concepts in a logical sequence.	Student exhibits above average usage of subject matter in assignment. Student provides above average ability in relating course content in examples given. Details and facts presented provide an adequate presentation of student's current level of subject matter knowledge.	The assignment reveals that the student has a general, fundamental understanding of the course material. Whereas, there are areas of some concerning in the linkages provided between facts and supporting statements. Student generally explains concepts, but only meets the minimum requirements in this area.	Student tries to explain some concepts, but overlooks critical details. Assignment appears vague or incomplete in various segments. Student presents concepts in isolation, and does not perceive to have a logical sequencing of ideas.	20

CRITICAL THINKING SKILLS	Student demonstrates a higher-level of critical thinking necessary for 300-400 level work. Learner provides a strategic approach in presenting examples of problem solving or critical thinking, while drawing logical conclusions which are not immediately obvious. Student provides well-supported ideas and reflection with a variety of current and/or world views in the assignment. Student presents a genuine intellectual development of ideas throughout assignment.	Student exhibits a good command of critical thinking skills in the presentation of material and supporting statements. Assignment demonstrates the student's above average use of relating concepts by using a variety of factors. Overall, student provides adequate conclusions, with 2 or fewer errors.	Student takes a common, conventional approach in guiding the reader through various linkages and connections presented in assignment. However, student presents a limited perspective on key concepts throughout assignment. Student appears to have problems applying information in a problem-solving manner.	Student demonstrates beginning understanding of key concepts, but overlooks critical details. Learner is unable to apply information in a problem-solving fashion. Student presents confusing statements and facts in assignment. No evidence or little semblance of critical thinking skills.	20
ORGANIZATION OF IDEAS/FORMAT	Student thoroughly understands and excels in explaining all major points. An original, unique, and/or imaginative approach to overall ideas, concepts, and findings is presented. Overall format of assignment includes an appropriate introduction (or abstract), well- developed paragraphs, and conclusion. Finished assignment demonstrates student's ability to plan and organize research in a logical sequence. Student uses at least of 5-7 references in assignment.	Student explains the majority of points and concepts in the assignment. Learner demonstrates a good skill level in formatting and organizing material in assignment. Student presents an above average level of preparedness, with a few formatting errors. Assignment contains less than 5 resources.	Learner applies some points and concepts incorrectly. Student uses a variety of formatting styles, with some inconsistencies throughout the paper. Assignment does not have a continuous pattern of logical sequencing. Student uses less than 3 sources or references.	Assignment reveals formatting errors and a lack of organization. Student presents an incomplete attempt to provide linkages or explanation of key terms. The lack of appropriate references or source materials demonstrates the student's need for additional help or training in this area. Student needs to review and revise the assignment.	20
WRITING CONVENTIONS (GRAMMAR & MECHANICS)	Student demonstrates an excellent command of grammar, as well as presents research in a clear and concise writing style. Presents a thorough, extensive	Student provides an effective display of good writing and grammar. Assignment reflects student's ability to select appropriate word usage	Assignment reflects basic writing and grammar, but more than 5 errors. Key terms and concepts are somewhat vague and not completely explained by	Topics, concepts, and ideas are not coherently discussed or expressed in assignments. Student's writing style is weak and needs	20

	understanding of word usage. Student excels in the selection and development of a well-planned research assignment. Assignment is error-free and reflects student's ability to prepare a high-quality academic assignment.	and present an above average presentation of a given topic or issue. Assignment appears to be well written with no more than 3-5 errors. Student provides a final written product that covers the above-minimal requirements.	student. Student uses a basic vocabulary in assignment. Student's writing ability is average, but demonstrates a basic understanding of the subject matter.	improvement, along with numerous proofreading errors. Assignment lacks clarity, consistency, and correctness. Student needs to review and revise assignment.	
USE OF COMPUTER TECHNOLOGY/ APPLICATIONS	Student provides a high-caliber, formatted assignment. Learner exhibits excellent use of computer technology in the development of assignment. Quality and appropriateness of stated references demonstrate the student's ability to use technology to conduct applicable research. Given assignment includes appropriate word processing, spreadsheet and/or other computer applications as part of the final product.	Assignment presents an above-average use of formatting skills, with less than 3 errors. Students has a good command of computer applications to format information and/or figures in an appropriate format. Student uses at least two types of computer applications to produce a quality assignment.	Student demonstrates a basic knowledge of computer applications. Appearance of final assignment demonstrates the student's limited ability to format and present data. Resources used in assignment are limited. Student may need to obtain further help in the use of computer applications and Internet research.	Student needs to develop better formatting skills. The student may need to take additional training or obtain help from the Educator Help Desk while preparing an assignment. Research and resources presented in the assignment are limited. Student needs to expand research scope. The number of formatting errors is not acceptable.	10
TOTAL POINTS					100