

# FLORIDA ATLANTIC UNIVERSITY™

## Graduate Programs—NEW COURSE PROPOSAL<sup>1</sup>

UGPC APPROVAL \_\_\_\_\_  
 UFS APPROVAL \_\_\_\_\_  
 SCNS SUBMITTAL \_\_\_\_\_  
 CONFIRMED \_\_\_\_\_  
 BANNER POSTED \_\_\_\_\_  
 CATALOG \_\_\_\_\_

DEPARTMENT: **CEECs**

COLLEGE: **ENGINEERING AND COMPUTER SCIENCE**

**RECOMMENDED COURSE IDENTIFICATION:**

PREFIX COP COURSE NUMBER **6215** LAB CODE (L or C) \_\_\_\_\_

(TO OBTAIN A COURSE NUMBER, CONTACT [MJENNING@FAU.EDU](mailto:mjennin@fau.edu))

COMPLETE COURSE TITLE: **ADVANCED COMPUTER NETWORKING**

CREDITS<sup>2</sup>:

**3**

TEXTBOOK INFORMATION: "COGNITIVE RADIO COMMUNICATIONS AND NETWORKS: PRINCIPLES AND PRACTICE,"  
 ALEXANDER M. WYGLINSKI, MAZIAR NEKOVEE, Y. THOMAS HOU, ACADEMIC PRESS, 2009, ISBN 978-0123747150

GRADING (SELECT ONLY ONE GRADING OPTION): REGULAR  SATISFACTORY/UNSATISFACTORY \_\_\_\_\_

**COURSE DESCRIPTION, NO MORE THAN THREE LINES:**

**This course covers advanced topics in computer networking, such as ad-hoc wireless networks, cognitive networking, delay-tolerant networks, and software defined networking. Students will understand the key mechanisms and networking protocols underlying these emerging networking architectures.**

**PREREQUISITES\*:**

**CNT4104 INTRODUCTION TO DATA COMMUNICATIONS, OR EQUIVALENT C/C++ PROGRAMMING**

**COREQUISITES\*:**

**REGISTRATION CONTROLS (MAJOR, COLLEGE, LEVEL)\*:**

\* PREREQUISITES, COREQUISITES AND REGISTRATION CONTROLS WILL BE ENFORCED FOR ALL COURSE SECTIONS.

**MINIMUM QUALIFICATIONS NEEDED TO TEACH THIS COURSE: PH.D.**

Faculty contact, email and complete phone number:  
 Dr. Ionut Cardei, [icardei@cse.fau.edu](mailto:icardei@cse.fau.edu)  
 561-2973401

Please consult and list departments that might be affected by the new course and attach comments.<sup>3</sup>

**Approved by:**

Department Chair: *Nurgun Endal*  
 College Curriculum Chair: *Will Tiller*  
 College Dean: *[Signature]*  
 UGPC Chair: *[Signature]*  
 Graduate College Dean: *[Signature]*  
 UFS President: \_\_\_\_\_  
 Provost: \_\_\_\_\_

**Date:**

*11/27/13*  
*11/27/13*  
*12/2/2013*  
*1/22/14*  
*1-29-14*

1. **Syllabus** must be attached; see guidelines for requirements: [www.fau.edu/provost/files/course\\_syllabus.2011.pdf](http://www.fau.edu/provost/files/course_syllabus.2011.pdf)
2. Review **Provost Memorandum: Definition of a Credit Hour** [www.fau.edu/provost/files/Definition\\_Credit\\_Hour\\_Memo\\_2012.pdf](http://www.fau.edu/provost/files/Definition_Credit_Hour_Memo_2012.pdf)
3. **Consent** from affected departments (attach if necessary)

Email this form and syllabus to [UGPC@fau.edu](mailto:UGPC@fau.edu) **one week before** the University Graduate Programs Committee meeting so that materials may be viewed on the UGPC website prior to the meeting.

**Department of Computer and Electrical Engineering and Computer Science  
Florida Atlantic University  
Course Syllabus**

<b>1. Course title/number, number of credit hours</b>	
<b>COP <del>6215</del> - Advanced Computer Networking</b> <span style="font-size: 1.2em; margin-left: 100px;">COP6215</span>	Graduate --- 3 credit hours
<b>2. Course prerequisites, co-requisites, and where the course fits in the program of study</b>	
CNT4104 Introduction to Data Communications, or equivalent C/C++ programming	
<b>3. Course logistics</b>	
Term: _____ Classroom: _____ Meeting time: _____ All course material and assignments are handled using Blackboard, at <a href="http://bb.fau.edu">http://bb.fau.edu</a> .	
<b>4. Instructor contact information</b>	
Instructor's name	Dr. Ionut Cardei
Office address	EE419
Office Hours	
Telephone #	561-2973401
Email address	icardei@cse.fau.edu
<b>5. Communication Policy</b>	
<i>The preferred mode of communication for private messages to the instructor is using Blackboard's Message tool. For questions or concerns related to the course, please check first the "Class Q&amp;A" Discussion Board on Blackboard. Expect answers within 48 hours from posting. For private messages sent via the Messages tool expect a reply within 24 hours, excluding the weekend period or holidays. For more urgent communication, contact the instructor via email.</i>	
<b>6. Course description</b>	
This graduate-level course covers advanced topics in computer networking, with emphasis on wireless networks and network virtualization. Areas of interest include ad-hoc wireless networks, cognitive networking, delay-tolerant networks, and software defined networking. The class has the format of a research seminar after the second half of the semester. The most important research publications in emerging networking topics are discussed in class and analyzed. Over the semester students familiarize with the ns3 network simulator and for the project they will develop and evaluate a novel network protocol for a specific network architecture.	
<b>7. Course objectives/student learning outcomes/program outcomes</b>	
<ol style="list-style-type: none"> <li>1. Understand the key mechanisms of emerging wireless and virtualized network architectures.</li> <li>2. Understand and appreciate the role and operation of networking protocols.</li> <li>3. Develop a new networking protocol and evaluate its performance using a network simulator.</li> </ol>	

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<b>8. Course evaluation method</b>	
2 exams ..... 30 % Assignments ..... 30 % Research Presentation ..... 10% Discussion board posts ..... 10 % Project ..... 20 %	The assignments include research paper analysis, network simulations.  The project consists of the design and development of a new networking protocol for a selected network architecture studied in class.
<b>9. Course grading scale (tentative)</b>	
A: 100-95, A-: 94-90, B+: 89-85, B: 84-80, B-:79-75, C+: 74-72, C: 71-68, C- 67-60, D: 59-50, F:49-0	
<b>10. Policy on makeup tests, late work, and incomplete grades</b>	
Students will not be penalized for absences due to participation in University-approved activities, including athletic or scholastics teams, musical and theatrical performances, and debate activities. These students will be allowed to make up missed work without any reduction in the student's final course grade provided the student gives prior notice of any absence or missed assignment. The same applies to students participating in a religious observance.  Late work is not acceptable, except for the afore-mentioned situations.  A final grade of Incomplete ("I") is reserved for students who are passing a course but have not completed all the required work because of exceptional circumstances.	
<b>11. Computing Resources and Software</b>	
Students should have access to a PC running Windows or Linux with internet access . Students are required to download and install the ns3 network simulator in order to complete assignments and the project. The software URL is at <a href="http://www.nsnam.org/">http://www.nsnam.org/</a> .	
<b>12. Participation and Classroom Etiquette</b>	
Attendance for students registered for the 'live' class sections is mandatory. All material and assignments will be posted on Blackboard. Students should log in at least two times per week to make sure they are up to date with announcements, postings, messages, and assignments. In order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular telephones, are to be disabled in class sessions. In addition, laptops can be used exclusively to follow lecture notes or to study other approved class material.	
<b>13. Disability policy statement</b>	
In compliance with the Americans with Disabilities Act (ADA), students who require special accommodations due to a disability to properly execute coursework must register with the Office for Students with Disabilities (OSD) located in Boca Raton campus, SU 133 (561) 297-3880 and follow all OSD procedures.	
<b>14. Honor code policy</b>	

URL to be added.

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Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and place high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. See University Regulation 4.001 at [www.fau.edu/regulations/chapter4/4.001\\_Code\\_of\\_Academic\\_Integrity.pdf](http://www.fau.edu/regulations/chapter4/4.001_Code_of_Academic_Integrity.pdf)

**15. Required texts/reading**

"Cognitive Radio Communications and Networks: Principles and Practice," Alexander M. Wyglinski, Maziar Nekovee, Y. Thomas Hou, Academic Press, 2010, ISBN 978-0123747150

**16. Supplementary/recommended readings**

The textbook is supplemented by research articles posted on the BB course Content page.

**17. Course outline**

TOPIC	Number of 1.5 hour lectures
Introduction	1
Wireless Networking Recap	2
Network Simulation with ns3	3
Issues in Cognitive Networking	
• RF Spectrum and Regulation	1
• Spectrum Sensing and Dynamic Access	2
• Cognitive Networking Architectures	3
• Cross-layer Cognitive Networking Routing Optimization	3
Delay Tolerant Networking	
• Issues with TCP/IP	1
• DTN Architecture Foundations	3
• Routing in DTN	3
Software-defined Networking and Network Virtualization	
• SDN Fundamentals: a Case for the Control Plane	1
• SDN Network Architecture	2
• OpenFlow	1
• Network Virtualization and Cloud Computing	2
Project Presentations	2