TO: The Faculty of the College of Engineering

FROM: School of Electrical and Computer Engineering of the College of Engineering

RE: New Graduate Course, ECE 60022 Wireless Communication Networks

The faculty of the School of Electrical and Computer Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

ECE 60020   Wireless Communication Networks
Sem. 2, Lecture 3, Cr. 3.
Prerequisite: ECE 54700 or consent of instructor

Prerequisite by Topic: Students are expected to enter the course with an introductory graduate-level understanding of networking, as well as a basic understanding of probability obtained from a typical undergraduate EE program.
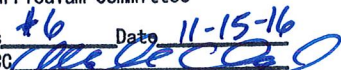
Description: This course will cover fundamental concepts in mobile wireless systems such as propagation and fading, cellular systems, channel assignment, power control, handoff, mobility management. It will also cover system and standards issues including second-generation circuit switched and third-generation packet switched networks, wireless LANs, mobile IP, and ad hoc networks. Besides providing an overview of current technologies, the emphasis on the course will be to identify the challenges that face the engineers of wireless communications networks.

Reason: Wireless Communication Networks is an advanced graduate level course focused on wireless networks. The target students are those who have taken an introductory graduate-level networking course (i.e., ECE 547), and who are interested in wireless networks. Hence, it is requested that the course be offered at the 600 level.

Michael R. Melloch, Associate Head
School of Electrical and Computer Engineering

Approved for the faculty of the Schools
of Engineering by the Engineering
Curriculum Committee

ECC Minutes **#6**   Date **11-15-16**
Chairman ECC

PURDUE UNIVERSITY
REQUEST FOR ADDITION, EXPIRATION, OR REVISION OF A GRADUATE COURSE
(50000-60000 LEVEL)

DEPARTMENT: Electrical and Computer Engineering   EFFECTIVE SESSION: Spring 2015

INSTRUCTIONS: Please check the items below which describe the purpose of this request.

☑ 1.	New course with supporting documents (complete proposal form)	☐ 7. Change in course attributes
☐ 2.	Add existing course offered at another campus	☐ 8. Change in instructional hours
☐ 3.	Expiration of a course	☐ 9. Change in course description
☐ 4.	Change in course number	☐ 10. Change in course requisites
☐ 5.	Change in course title	☐ 11. Change in semesters offered
☐ 6.	Change in course credit/type	☐ 12. Transfer from one department to another

PROPOSED:

Subject Abbreviation: ECE

Course Number: 60022

Long Title: Wireless Communication Networks

Short Title: Wireless Communicat Networks
Abbreviated title will be entered by the Office of the Registrar if omitted. (30 CHARACTERS ONLY)

EXISTING:

Subject Abbreviation:

Course Number:

TERMS OFFERED
Check All That Apply:

☐ Fall   ☑ Spring   ☐ Summer

CAMPUS(ES) INVOLVED

☐ Calumet   ☐ N. Central
☐ Cont Ed   ☐ Tech Statewide
☐ Ft. Wayne   ☑ W. Lafayette
☐ Indianapolis

CREDIT TYPE

1. Fixed Credit: Cr. Hrs. 3.0
2. Variable Credit Range:
   Minimum Cr. Hrs
   (Check One) To ☐ Or ☐
   Maximum Cr. Hrs
3. Equivalent Credit: Yes ☐ No ☑
4. Thesis Credit: Yes ☐ No ☑

COURSE ATTRIBUTES: Check All That Apply

1. Pass/Not Pass Only ☐
2. Satisfactory/Unsatisfactory Only ☐
3. Repeatable ☐
   Maximum Repeatable Credit: ☐
4. Credit by Examination ☐
5. Fees ☐ Coop ☐ Lab ☐ Rate Request
   Include comment to explain fee

6. Registration Approval Type
   Department ☐   Instructor ☐
7. Variable Title ☐
8. Honors ☐
9. Full Time Privilege ☐
10. Off Campus Experience ☐

Schedule Type	Minutes Per Mtg	Meetings Per Week	Weeks Offered	% of Credit Allocated
Lecture	75	2	16	100%
Recitation				
Presentation				
Laboratory				
Lab Prep				
Studio				
Distance				
Clinic				
Experiential				
Research				
Ind. Study				
Pract/Observ				

Cross-Listed Courses

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):

This course will cover fundamental concepts in mobile wireless systems such as propagation and fading, cellular systems, channel assignment, power control, handoff, mobility management. It will also cover system and standards issues including second-generation circuit switched and third-generation packet switched networks, wireless LANs, mobile IP, and ad hoc networks. Besides providing an overview of current technologies, the emphasis on the course will be to identify the challenges that face the engineers of wireless communications networks.

*COURSE LEARNING OUTCOMES:

(a) Students will acquire a solid understanding of the fundamental principles of wireless communication networks
(b) Students will be able to use basic analytical tools to study the performance of cellular and ad hoc wireless networks
(c) Students will be able to present results through written communications
(d) Students will be able to identify the key challenges facing future wireless networks

Calumet Department Head	Date	Calumet School Dean	Date	Calumet Director of Graduate Studies	Date
Fort Wayne Department Head	Date	Fort Wayne School Dean	Date	Fort Wayne Director of Graduate Studies	Date
Indianapolis Department Head	Date	Indianapolis School Dean	Date	IUPUI Associate Dean for Graduate Education	Date
North Central Department Head	Date	North Central School Dean	Date	North Central Director of Graduate Studies	Date
Michael R McCulloch 10/6/16 West Lafayette Department Head	Date	*[signature]* 12/2/16 West Lafayette College/School Dean	Date	Date Approved by Graduate Council	Date
Graduate Area Committee Convener	Date	Graduate Dean	Date	Graduate Council Secretary	Date
				West Lafayette Registrar	Date

OFFICE OF THE REGISTRAR

Supporting Document to the Form 40G
for a New Graduate Course

To: Purdue University Graduate Council

From: Faculty Member: Xiaojun Lin

          Department: Electrical and Computer Engineering

          Campus: West Lafayette

Date:

Subject: Proposal for New Graduate Course

Contact for information   Name: Matt Golden
if questions arise: Phone: 494-3374
                         Email: goldenm@purdue.edu
                         Address: EE Building, Room 135

Course Subject Abbreviation and Number: ECE 60022

Course Title: Wireless Communication Networks

Course Description:
      This course will cover fundamental concepts in mobile wireless systems such as propagation and fading, cellular systems, channel assignment, power control, handoff, mobility management. It will also cover system and standards issues including second-generation circuit switched and third-generation packet switched networks, wireless LANs, mobile IP, and ad hoc networks. Besides providing an overview of current technologies, the emphasis on the course will be to identify the challenges that face the engineers of wireless communications networks.

Semesters Offered:
      For the benefit of graduate student plan of study development, how frequently will this prototype be offered? Which semesters?

      Spring Even Years

A. Justification for the Course:

Provide a complete and detailed explanation of the need for the course (e. g., in the preparation of students, in providing new knowledge/training in one or more topics, in meeting degree requirements, etc.), how the course contributes to existing majors and/or concentrations, and how the course relates to other graduate courses offered by the department, other departments, or interdisciplinary programs.

Justify the level of the proposed graduate course (500- or 600-level) including statements on, but not limited to: (1) the target audience, including the anticipated number of undergraduate and graduate students who will enroll in the course; and (2) the rigor of the course.

- Wireless Communication Networks is an advanced graduate level course focused on wireless networks. The target students are those who have taken an introductory graduate-level networking course (i.e., ECE 547), and who are interested in wireless networks. Hence, it is requested that the course be offered at the 600 level.

  Use the following criteria:
  Graduate Council policy requires that courses at the 50000 level in the Purdue system should be taught at the graduate level and meet four criteria: a) the use of primary literature in conjunction with advanced secondary sources (i.e., advanced textbooks); b) assessments that demonstrate synthesis of concepts and ideas by students; c) demonstrations that topics are current, and; d) components that emphasize research approaches/methods or discovery efforts in the course content area (reading the research, critiquing articles, proposing research, performing research). Such courses should be taught so that undergraduate students are expected to rise to the level of graduate work and be assessed in the same manner as the graduate students.

- Anticipated enrollment
  - Undergraduate
  - Graduate   10

B. Learning Outcomes and Method of Evaluation or Assessment:

ECE Graduate Learning Outcomes:

a. Knowledge and Scholarship (thesis/non-thesis)
b. Communication (thesis/non-thesis)
c. Critical Thinking (thesis/non-thesis)
d. Ethical and Responsible Research (thesis) or Professional and Ethical Responsibility (non-thesis)

- List Learning Objectives for this course and map each Learning Objective to one

or more of the ECE Learning Outcomes (a-d, listed above):

(a) Students will acquire a solid understanding of the fundamental principles of wireless communication networks

(b) Students will be able to use basic analytical tools to study the performance of cellular and ad hoc wireless networks

(c) Students will be able to present results through written communications

(d) Students will be able to identify the key challenges facing future wireless networks.

- Methods of Instruction

  o Lecture

- Will/can this course be offered via Distance Learning?

  o The course will not be offered via Distance Learning though it could be if necessary.

- Grading Criteria

Grading criteria (select from checklist); include a statement describing the criteria that will be used to assess students and how the final grade will be determined. Add and delete rows as needed.

  o 1 midterm exam
  o 1 assigned project and 1 student-selected final project
  o Multiple homework assignments

  ▶ Describe the criteria that will be used to assess students and how the final grade will be determined:

  The course will be graded primarily on a combination of exam and course projects. A smaller part of the grade will be based on homeworks and class participation. The examination component will include one mid-term.

C. Prerequisite(s):

List prerequisites and/or experiences/background required. If no prerequisites are indicated, provide an explanation for their absence. Add bullets as needed.

* ECE 54700 or consent of instructor
* Prerequisite by Topic: Students are expected to enter the course with an introductory graduate-level understanding of networking, as well as a basic understanding of probability obtained from a typical undergraduate EE program.

D. Course Instructor(s):

Provide the name, rank, and department/program affiliation of the instructor(s). Is the instructor currently a member of the Graduate Faculty? (If the answer is no, indicate when it is expected that a request will be submitted.) Add rows as needed.

Name	Rank	Dept.	Graduate Faculty or expected date
Xiaojun Lin	Associate Professor	ECEN	Yes

E. Course Outline:

Provide an outline of topics to be covered and indicate the relative amount of time or emphasis devoted to each topic. If laboratory of field experiences are used to supplement a lecture course, explain the value of the experience(s) to enhance the quality of the course and student learning. For special topics courses, include a sample outline of a course that would be offered under the proposed course. **(This information must be listed and may be copied from syllabus).**

Weeks	*Principal Topics*
1	Historic Milestones and Current Wireless Networks
2	Understanding the Wireless Communication Channel
3	Concept of Cellular Communications, Handoff, and Location Management
4-5	Channel Allocation Techniques
6	Modulation and Multiple Access Techniques (FDMA, TDMA, CDMA)
7	Power Control for CDMA Networks
8	Case Studies of 2G Systems (GSM and IS-95)
9-10	3G Systems (Opportunistic Scheduling and Dynamic Resource

Allocation

11	Mobile IP
12	Wireless LANs (e.g. 802.11, Bluetooth, etc.)
13-15	Ad hoc and Sensor Networks (Routing, Scheduling, Capacity-Delay Tradeoff and Cross-Layer Design)

F. Reading List (including course text):

A primary reading list or bibliography should be limited to material the students will be required to read in order to successfully complete the course. It should not be a compilation of general reference material.

A secondary reading list or bibliography should include material students may use as background information.

- Primary Reading List

    o Mischa Schwartz, Mobile Wireless Communications, Cambridge University Press, 2005 (in addition to class notes).

- Secondary Reading List

G. Library Resources

Describe any library resources that are currently available or the resources needed to support this proposed course.

H. Course Syllabus
(While not a necessary component of this supporting document, an example of a course syllabus is available, for information, by clicking on the link below, which goes to the *Graduate School's Policies and Procedures Manual for Administering Graduate Student Program.*
See Appendix K.
http://www.purdue.edu/gradschool/faculty/documents/Graduate_School_Policies_a nd_Procedures_Manual.pdf