REQUEST FOR A NEW COURSE
University of Central Oklahoma

Course Subject (Prefix), Number, and Title:

Course Subject Number Course Title (maximum of 30 characters)
ENGR 4243 IoT Systems & Lab

*Remember when abbreviating names, this is how they will appear on student's transcripts.

Course Title: (full title of course if longer than 30 characters)
Internet of Things Systems & Lab

For information regarding CIP codes contact your department chair or visit: http://www.uco.edu/academic-affairs/ir/program_inventory.asp
CIP Code: 14.0901

For graduate courses, please attach a syllabus for this course. (See syllabus requirement policy 2.2.)

Course description as it will appear in the appropriate catalog.
Course description only Do not include prerequisites or enrollment restrictions, these should be added under questions 6-12.
(Please use standard American English including full sentences.)

The Internet of Things (IoT) Systems and Lab is a course about the new paradigm of objects interacting with people, with information systems, and with other objects. The course will have a lab component and will focus on creative thinking and hands-on project development. This course will describe the market around the IoT, the technology used to build these kinds of devices, how they communicate, how they store data, and the kinds of distributed systems needed to support them.

Engineering and Physics
Department submitting the proposal

Nesreen Alsou
Person to contact with questions
nalsbou@uco.edu
email address

Approved by:

Department Chairperson

College Dean

Office of Academic Affairs

College Curriculum Committee Chair

Academic Affairs Curriculum or Graduate Council

Effective term for this new course
(Assigned by the Office of Academic Affairs.)
1. Does this course have an undergraduate / graduate counterpart?
   ___ Yes  X  No

2. Is this proposal part of a larger submission package including a program change?
   X  Yes  ___  No

3. Does this new course affect a teacher preparation program? (All courses required for any teacher preparation program must have approval from the Council on Teacher Education (CTE) before approval from AACC or Graduate Council.)
   ___ Yes  X  No  If yes, send copy of proposal to the Education Curriculum Committee Chair, Dr. Darla Fent.

4. Has this course been previously taught as a common course (4910 seminar, 4960 institute, etc.)?
   ___ Yes  X  No  If yes, when was the most recent offering? ________________________________

5. Does this course affect majors or minors outside the department?
   X  Yes  No  If yes, provide name(s) of department chair(s) contacted, dates, and results of discussion.
   This new course is part of the curriculum for the currently-proposed Computer Engineering B.S., which the Department of Engineering & Physics developed as a joint degree through discussions in 2019 and 2020 with Dr. Gang Qian from Computer Science.

6. Prerequisite courses:
   ENGR 2303, ENGR 2311, ENGR 3223, and ENGR 3613

7. Co-requisite(s): Which of the above prerequisite courses, if any, may be taken in the same semester as the proposed new course?
   ENGR 3613

8. Concurrent enrollment: Courses that must be taken the same semester. Example: lab courses.
   None

9. Will this course have enrollment restrictions?
   ___ Yes  X  No  If No, go to question 13.

10. Specify which major(s) may or may not take this course. Specifying a major, excludes all other majors from enrolling.
   Check one: May ______  May not ______
   Major Code: ____________________________

11. Which of the following student classification(s) may enroll in this course?
    Check all that apply.
    Graduate  (2) 19 + hours
    Graduate  (1) 0-18 hours
    Post Baccalaureate *
    Senior
    Junior
    Sophomore
    Freshman
    * Graduate level courses are not open to Post Baccalaureate students;

12. Check or list other restrictions for this course.
    Admission to Graduate Programs
    Admission to Nursing Program
    Admission to Teacher Education
    Other ________________

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* Graduate level courses are not open to Post Baccalaureate students;
13. **Course objectives**: Objectives should be observable, measurable and include scholarly or creative activities to meet the course level characteristics. Course objectives should also be in line with the course description. (Please refer to instructional objectives documents at: [http://www.uco.edu/academic-affairs/faculty-staff/aacc.asp#FAQ/Helpful%20Hints](http://www.uco.edu/academic-affairs/faculty-staff/aacc.asp#FAQ/Helpful%20Hints).)

Upon completion of this course, students will be able to:
- Describe what IoT is and how it works;
- Recognize the factors that contributed to the emergence of IoT;
- Design and program IoT devices;
- Use real IoT protocols for communication;
- Secure the elements of an IoT device;
- Design an IoT device to work with a Cloud Computing infrastructure;
- Transfer IoT data to the cloud and in between cloud providers;
- Define the infrastructure for supporting IoT deployments.

Course Detail Information:

14. **Contact Hours (per week)**

<table>
<thead>
<tr>
<th>Activity Type</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture (in class)</td>
<td>2</td>
</tr>
<tr>
<td>Lab (also studios)</td>
<td>3</td>
</tr>
<tr>
<td>Other (outside activities)</td>
<td>0</td>
</tr>
</tbody>
</table>

15. **Repeatable course.**

- Number of times this course can be taken for credit: 1

16. **Schedule type**: (select one only)

- Activity P.E. (A)
- Lab only (B)
- Lecture/Lab (C)
- Lecture only (L)
- Recitation/Lab (R)
- Student Teaching (STU)
- Studio Art/Design (XSU)

17. **List existing course(s) for which this course will be a prerequisite.** Adding a "new course" as a prerequisite to an existing course will likely cause enrollment problems. (Please submit a prerequisite change form for each course for which this course will serve as a prerequisite.)

None

18. **What resources, technology or equipment must be acquired to teach this course?** List items which must be purchased and estimate cost. (Be specific, e.g., technology software, equipment, computer lab; etc.)

None

19. **The UCO Library has the required library resources available for this new course?**

- Yes
- No

If yes, provide names of Librarian/Faculty Liaisons contacted, dates, and results of discussion.
Librarian Deborah Thompson was contacted on July 20, 2020. Resources are currently available for this course. Databases, journals, books, and electronic access sites are available to students through the UCO virtual library and interlibrary loan system.

If no, what additional library resources must be acquired for this new course? List items which must be purchased and estimated cost. (Be specific, e.g., books, magazines, journals, etc.)

N/A
20. Names of current faculty qualified to teach this course.
   Dr. Nesreen Alsbou

21. Additional faculty (adjunct or full-time) required and specific competencies required to teach this course:
   No additional full-time faculty will be required: Competencies are a background in EE and experience working with the embedded systems found in IoT devices.

22. How will this course be staffed and equipped? Identify the additional costs associated with this new course. If no costs, explain why not.
   The course will use current equipment in the department's two EE labs. Supplies needed to support the lab will be purchased with the fees generated by students taking the course (the current CMS fees are sufficient for this purpose). The department currently employs an Electronics Laboratory Associate to support its EE labs, and this lab will be part of those duties. This course is being added as an elective to the EE program. The three-hour instructional load for the primary course instructor may require an adjunct to pick up a lower level course that is currently part of her load.

23. Identify the source(s) of funds for any additional costs for the new course. i.e. internal reallocations, special fees from students, etc. If you plan to propose special fees be assessed for this course, be aware there is a separate approval process for special fees.
   Tuition revenue from this course should more than offset the instructional cost of the adjunct covering the primary instructor's current load.

24. Projected enrollment for two academic years following approval of new course:

<table>
<thead>
<tr>
<th>Semester</th>
<th>2021-2022</th>
<th>2022-2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td></td>
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<tr>
<td>Summer</td>
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</tbody>
</table>

25. Using State Regents' definition of liberal arts and sciences (quoted below), characterize the course as follows:
   - Liberal arts and sciences
   - Non-liberal arts and sciences

   "The liberal arts and sciences are defined as those traditional fields of study in the humanities; social and behavioral sciences; communications; natural and life sciences, mathematics; and the history, literature, and theory of fine arts (music, art, drama, dance). Courses in these fields whose primary purpose is directed toward specific occupational or professional objectives, or courses in the arts which rely substantially on studio or performance work are not considered to be liberal arts and sciences for the purpose of this policy. Courses required for the General Educational Program are not necessarily synonymous or mutually exclusive with the liberal arts and sciences."  
   State Regents Policy and Procedures. Chapter 2, Section 5, "Degree Requirements" part 1, (2), P. II-2-86

26. Please provide a concise, yet comprehensive, statement that explains the reasons for requesting the new course. Include documentation or assessment information supporting the specific request (if possible). Indicate the expected source of student enrollment (majors, minors, programs etc.)
   This course was developed to provide instructional support for Electrical Engineers and Biomedical Engineers to become competitive for positions that require expertise in embedded devices communicating via the internet. It provides support for the department's Internet of Things (IoT) Research Lab, while also supporting the IoT concentration in the new Computer Engineering program being proposed jointly by the departments of Engineering & Physics and
Computer Science. Note that this course is being requested independently of whether that proposal is successful, since it supports students in other engineering programs.

27 Which of the six transformative learning tenets does this course incorporate? (check all that apply or only those that apply) This question was a directive from the Provost and is used for informational purposes.

Discipline Knowledge

Leadership

Research, Scholarly and Creative Activities

Service Learning and Civic Engagement

Global and Cultural Competencies

Health and Wellness

28. Clearly explain how the characteristics of this course meet or exceed those outlined in Course Level Characteristics. (Copy and paste table from “Course Level Characteristics” document for the appropriate course level of proposed course. Document may be found on: http://sites.uco.edu/academic-affairs/files/course-level-characteristics-table.doc.

<table>
<thead>
<tr>
<th>Course Level Characteristics</th>
<th>Please describe how this course meets this requirement.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is assumed that students in these courses have completed sufficient course work to have attained senior standing.</td>
<td>The prerequisite structure that leads to the specific prerequisites for this course (which include two 3000-level courses) will ensure that students have achieved senior standing.</td>
</tr>
<tr>
<td>2. It is assumed that students in these courses have a substantial background in the area of inquiry equivalent to 15 hours of study. Area of inquiry is defined broadly, including courses in the offering department, as well as courses in other departments that relate to the subject of study.</td>
<td>The prerequisite structure that leads to the specific prerequisites for this course (which include two 3000-level courses) encompasses more than the required 15 hours of study.</td>
</tr>
<tr>
<td>3. These courses should be offered at a level of sophistication of instruction and of expected student performance that is beyond that of other undergraduate courses. In short, 4000 level courses should offer more in-depth study than courses offered at the 3000 level and below.</td>
<td>This course requires students to synthesize the knowledge and apply the skills acquired in the prerequisite courses for this course.</td>
</tr>
<tr>
<td>4. Students in these courses should be required to undertake a substantial scholarly activity in addition to classroom instruction, such as a written research project, library assignment, juried performance, or creative work.</td>
<td>Students in this course will complete experimental design projects requiring creative solutions to engineering problems related to embedded devices that communicate through the internet. The results will be presented in the form of a written technical report.</td>
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<tr>
<td>5. Included among 4000 level courses would be capstone courses that review and integrate previous learning, practicums and student teaching, and courses in which a major instructional responsibility is placed on the student (as in individual studies, directed readings, and seminars).</td>
<td>Students in engineering programs at UCO are required to take separate 4000-level capstone courses</td>
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</tbody>
</table>