REQUEST FOR A NEW COURSE
University of Central Oklahoma

Course Subject (Prefix), Number, and Title:

Course Subject | Recommended Course Number | Course Title (maximum of 30 characters)
-----------------|---------------------------|----------------------------------------
CMSC            | 4143                      | Algos for Machine Learning

*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)

Algorithms for Machine Learning

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

CIP Code: 14.0999

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.)

Machine learning is concerned with the question of how to construct computer programs that automatically improve their performance through experience. This course provides an in-depth study of modern algorithms for machine learning, such as supervised learning, unsupervised learning, and reinforcement learning.

Computer Science

Department submitting the proposal

Jicheng Fu
Person to contact with questions
Email address

Jicheng Fu
Digitally signed by Jicheng Fu
Date 2020.09.05 21:51:40 -05'00'

Department Chairperson
Date

Gwen Cahill
College Dean
Date

Effective term for this new course
(Assigned by the Office of Academic Affairs.)

Office of Academic Affairs
Date

Academic Affairs Form
August, 2015

Academic Affairs Form
August, 2015
1. Does this course have an undergraduate / graduate counterpart?
   X Yes  ___ 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.)?
   X Yes  ___ No  If yes, when was the most recent offering?  Fall 2019

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.
   Dr. Byrne, Math & Stats Department, 9/9/2019, no concerns about this course

6. Prerequisite courses:
   Example 1: MATH 1213 and (MATH 2165 or MATH 2185) and CHEM 1213
   Example 2: (ACCT 2113 and 2213) and (MGMT 3013 or ISOM 3613)
   CMSC 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?
   None

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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Academic Affairs Form
August, 2015

Functional Review  CF
undergraduate proposals only)
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.)

Upon satisfactory completion of this course, students will be able to:

1) vectorize and normalize datasets
2) differentiate between supervised, unsupervised, and reinforcement learning tasks
3) evaluate which learning algorithms are appropriate for what kind of tasks
4) use a programming language to implement various supervised, unsupervised, and reinforcement machine 
   learning algorithms
5) employ machine learning algorithms to solve real-world problems

Course Detail Information:

14. Contact Hours (per week)
   - 3 Lecture hours (in class)
   - Lab hours (also studios)
   - Other (outside activities)

15. Repeatable course.
   - Number of times this course can be taken for credit

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.)
   - Existing teaching resources are adequate for the proposed course.

19. The UCO Library has the required library resources available for this new course?
   - X Yes  __ No  If yes, provide names of Librarian/Faculty Liaison contacted, dates, and results of discussion. 
   Ms. Dawn Holt, Faculty Liaison, has confirmed on September 10, 2019 that the ACM and IEEE 
databases at UCO library are adequate resources for this course.

   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.)
20. Names of current faculty qualified to teach this course:

   Dr. Jicheng Fu, Dr. Gang Qian

21. Additional faculty (adjunct or full-time) required and specific competencies required to teach this course:

   None

22. How will this course be staffed and equipped? Identify the additional costs associated with this new course. If no costs, explain why not.

   There will be no additional cost for the proposed course. When this new course is offered, the frequency and the number of sections of other elective courses will be adjusted correspondingly so that the total number of hours taught each semester will remain the same. Moreover, the current budget for the department is enough to cover equipment cost (if any) for the proposed course should the need arise.

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.

   N/A

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

<table>
<thead>
<tr>
<th>Semester</th>
<th>2020-2021</th>
<th>2021-2022</th>
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<tbody>
<tr>
<td>Fall</td>
<td>30</td>
<td>35</td>
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<tr>
<td>Spring</td>
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<tr>
<td>Summer</td>
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25. Using State Regents' definition of liberal arts and sciences (quoted below), characterize the course as follows:

   X  Non-liberal arts and sciences
   ___ 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.)

   The past decade has seen the rapid development of machine learning, which has shifted the focus of AI research from academia to the real world. ComputerWorld magazine lists machine learning as the most important of "the 12 IT skills that employers can't say no to." This course will equip students with fundamental knowledge in supervised, unsupervised, and reinforcement learning. Students will develop skills of analyzing and applying machine learning algorithms to solve real-world problems. The successful completion of this course will build a solid foundation for students' future career development. Students pursuing a computer science or software engineering major may enroll in this course for upper-division elective credit.
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](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>
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<tbody>
<tr>
<td>1. It is assumed that students in these courses have completed sufficient course work to have attained senior standing.</td>
<td>CMSC 3613 Data Structures and Algorithms is the prerequisite.</td>
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<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>Students who have satisfied the prerequisites should have at least 15 hours of study in computer science and mathematics.</td>
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<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>The assignments required in this course will ask students to draw upon what they have learned in CMSC 3613 in order to understand, design, and implement algorithms for machine learning.</td>
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<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>Machine Learning is the application of Artificial Intelligence techniques to solve problems that are difficult for traditional techniques to handle. All the assignments involve substantial scholarly activities in analyzing and modeling the problems to be solved. Students are also required to complete a written library assignment on machine learning.</td>
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<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>CMSC 4513 (Software Design &amp; Development) is the capstone course for computer science majors and SE 4513 (Software Engineering Senior Project) is the capstone for software engineering majors. The knowledge learned from this course helps to prepare students for the capstone courses.</td>
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